



Workshop Summary Report

(Draft)

Latin American Regional Workshop on Electricity & Development April 13-14, 2005 Rio de Janeiro, Brazil

Organized by
Centro Clima/COPPE, Federal University of Rio de Janeiro
CENBIO, University of São Paulo
Global Network on Energy for Sustainable Development (GNESD)

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1. Introduction

The Global Network on Energy for Sustainable Development (GNESD) in collaboration with UNEP, UNDP and the IEA are organizing a series of regional engagements and workshops focused on the role of electricity for promoting sustainable development. The dual challenge of linking electrification enhancement with national development goals, while providing increased electricity access to the poor, is the key theme for these series of workshops.

The workshop series aims to bring together the best minds in economic development, energy infrastructure and technology, finance and public policy from developed and developing countries to forge new, cost effective approaches to help create a sustainable energy future. The dual challenge of ensuring electricity access for national economic development and at the same time providing increased access to the poor parts of the population is the key theme for these series of workshops.

The first workshop, “Electricity and Development”, was held at the IEA headquarters in Paris on 17-18 January 2005. It highlighted that currently 1.6 billion people lack electricity access worldwide, with direct link on persistency of poverty. The workshop also underlined that without major policy action and increase in investment in the electricity sector, in 2030 1.4 billion people will still lack electricity. The Latin America regional workshop was realized in April 13 and 14, 2005, in Rio de Janeiro, Brazil. As part of the same series, the Asian and African regional workshops occurred in the first semester of 2005 in Thailand and in and Nairobi, respectively.

2. Organization and Objectives

The Latin America Asian regional workshop organised by Centro Clima and CENBIO, who jointly constitute the GNESD node in Brazil. The intended to discuss the dual policy

challenge in the Latin-American context: securing investment for expanding electricity supply while simultaneously enhancing the access of the poor to electricity. In addition, it is expected to inform regional stakeholders about key policy options in support of expanding access to electricity for the poor based on the findings from the policy analysis work the GNESD has conducted in Brazil and other Latin American countries.

The main objective of the Latin America workshop was to discuss the challenge of increasing the electricity access of the poor in a sustainable way. The role of electricity in the whole development process, i.e. the way electricity can help to increase development indexes, was also one of the main issues addressed during the workshop. The issues, approaches, recommendations to deal with these two main themes, emerging from presentations and floor discussion are presented in the sections below.

Participants included experts in energy, electricity, environment, engineering, technology, finance, economics, and policy makers from governments, international institutions and private sector, experts from universities and national laboratories as well as representatives of multilateral and bilateral development cooperation agencies and NGOs. 45 participants attended the workshop coming from 10 countries and 4 international organizations and donor agencies attended the workshop. A detailed workshop program is provided in *Annex I*. List of the participants is given in *Annex II*. The presentations prepared by the speakers for the workshop are being uploaded in the Centro Clima's site (www.centroclima.org.br). This site is being reformulated, and soon as possible all the presentations can be accessed.

3. Electricity and Development: Status and prospects in Latin America

In 1999, LAC produced 8.8% of the world's total energy and consumed 6.7%. It has 13.5% of proven oil reserves and produces 5.8% of the oil consumed, even considering that it has 8.4% refining capacity. Mexico and Venezuela have the largest proven reserves.

The Region possesses 5.6% of proven natural gas world reserves, Mexico and Venezuela again having the largest reserves. Brazil and Colombia have the largest coal reserves. Under the current exploration schemes, proven regional reserves of oil and natural gas will suffice for more than forty years and coal reserves for over 300 years.

LAC has an abundant hydroelectric potential, detaining 18.8% of the world potential. Brazil leads in this area, followed by Colombia (Figure 1). Hydroelectric power still has great possibilities of use in the Region, having the advantage of being a clean energy and, therefore, being in line with the Kyoto Protocol. In this context, it is important to mention that nowadays SHPs (<30MW) are being considered the sustainable way to take advantage from the hydro energy, considering the relevant local (environmental, social, etc.) impacts caused by the large hydro plants. In Brazil, especially in the Amazon Region, this kind of discussions is very updated.

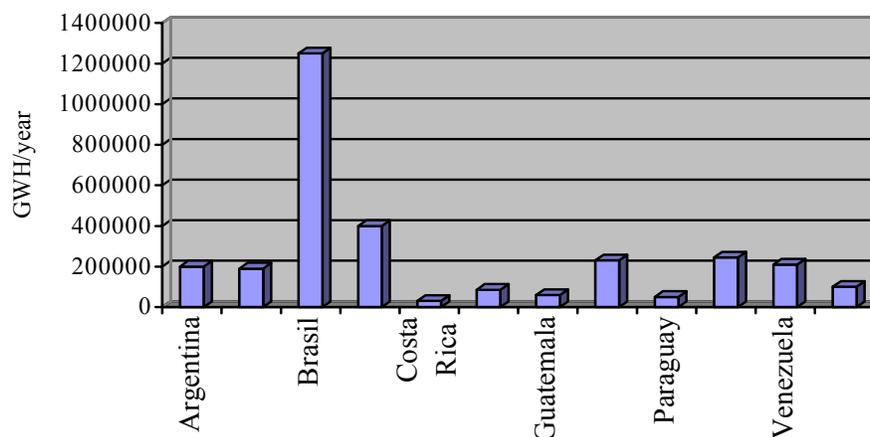


Figure 1: Hydro electrical potential in Latin America – GWh/year

Source: OLADE and CEPAL, 2005

Historically, the governments in the region were responsible for the energy infrastructure and suppliers enjoyed monopolistic privileges. But once markets started to be opened, private enterprise entered in full force into the sector.

The implementation of reforms was, however, not homogeneous. The countries in the south of the continent, Argentina and Chile, were pioneers, whereas the countries rich in energy resources such as Mexico and Venezuela proceeded more slowly. The gas and electricity sectors are a good example of this: they are intimately related because of the generating units of the combined cycle, and they did not progress as fast or in the same way in different countries.

In the electrical sector, Argentina, Bolivia, Chile, Colombia, El Salvador, Guatemala, Panama and Peru opened their markets to some entirely and other partially private companies. Some Central American countries opened their markets to private participation and created regulatory entities.

Although Brazil, Costa Rica, Ecuador and Venezuela allowed private and mixed companies a restricted participation in their electrical system, most of the large companies in this sector continued to be state owned, especially in the generating area.

Argentina, Mexico and Bolivia opened their natural gas markets, while Argentina privatized the sector. Brazil, Colombia, Chile, Trinidad, Tobago and Venezuela have private, mixed and state companies regulated under state jurisdiction. In other countries the natural gas market is starting to develop.

These two sectors (electricity and natural gas) were responsible for a private investment surge in the countries involved that allowed them to invest more in the social field.

On the other hand, these private investments resulting from the reforms undertaken had a large participation in regional integration projects. The best known are in the MERCOSUL area, but there are other examples in Latin America and the Caribbean.

The Region is known for having all kinds of energy resources in quantities that guarantee the supply at long term not only of the Region, but also for other parts of the world. It exports mainly oil and coal and could, if current consumption levels are maintained, continue to do so during the coming 25 years.

The energy integration of Latin America is very important. In the region, there are various energy issues. Demands differ widely between northern Latin America, Central America and Caribbean, and southern Latin America. Southern Latin America is currently undergoing integration in the use of natural gas, with Bolivia becoming a regional producer and a factor of influence. In northern Latin America, the integration is with respect to electrical integration and how to cooperate and help each other in such an important issue. Central America has a completely different situation, with firewood as practically the only source of energy and the problems arising from burning wood and ensuing ecological impacts. In the Caribbean, the issue of energy supply is also related to gas: it is the only way to provide energy.

In fact, regional integration is a gradual process that will be made easier by the elimination of barriers and the dovetailing of regulatory rules. Potential investors are attracted by firm transparent norms. MERCOSUL countries are starting to visualize the first steps in this direction, whereas Central America still discusses rules for integration and operation of the systems involved.

Another important point is that the Region, by using its natural resources, mainly natural gas and hydroelectricity, could meet the requirements stipulated in climate agreements, and join their efforts to mitigate the greenhouse effect by emitting less CO₂ in new integration projects. Also, the use of this kind of resources is fundamental considering the natural decline of the petroleum age, and the fact that the electricity demand of all countries in Latin America is in an expanding process (OLADE, 2005). Without a massive change in the energy mix worldwide, it will not be possible to ensure that supply will meet demand on a sustainable basis

The new renewable energy sources and the use of new technologies for the clean use of mineral coal are also applicable and favor this objective. In fact, South America also makes use of alternative energies, in particular, hydropower: only 10% of the capacity is being used and there is, therefore, an enormous opportunity to develop this potential, especially in Brazil, Colombia and Ecuador. Development of this type of energy, in a sustainable way, should be the top priority when the main objective is to provide energy for the Latin America people (especially, the poor). This is important for the social and economic development of Latin America, with cheap and feasible energy. Latin America and the Caribbean are not very concerned with energy security. The entire world is moving towards energy security and ensuring that they will have energy for the next few decades. The lack (and the quality) of energy is a very serious problem for the development of an economy, and mainly to improve the social life conditions of the poor people in Latin America.

In this context, some key initiatives can be mentioned in the context of expanding the use of renewables energies in Latin America:

- The establishment of the PROINFA program in Brazil that will result in 3.3 GW of renewable energy supply contracts by 2006;
- The passage of a Renewable Energy Law in Guatemala that offers substantial incentives for investing in renewables including, generous tax exemptions;
- The creation of a regional renewable energy project – Caribbean Renewable Energy Development Programme (CREDP) – for the Caribbean islands, designed to stimulate a regional transition to renewable energy generation;
- Innovative rural electrification finance projects in Bolivia, Brazil, Peru, and Honduras;
- The establishment of national energy efficiency programs and standards in Argentina, Mexico, Brazil, Chile and others.

Complementing this third section of the present report, it's important to mention that the access of the population to energy services improved notably in the last two decades. Nowadays, the majority of the Latin American countries register more than 80% of households with electricity (Figure 2). The lack of access in Latin America, as observed in Brazil, is concentrated in the rural regions that usually register worst Human Development Indexes (HDI) (comparing with the urban regions of Latin America). So, it's possible to estimate a clear and close relationship between living conditions and access to electrical energy in Latin America.

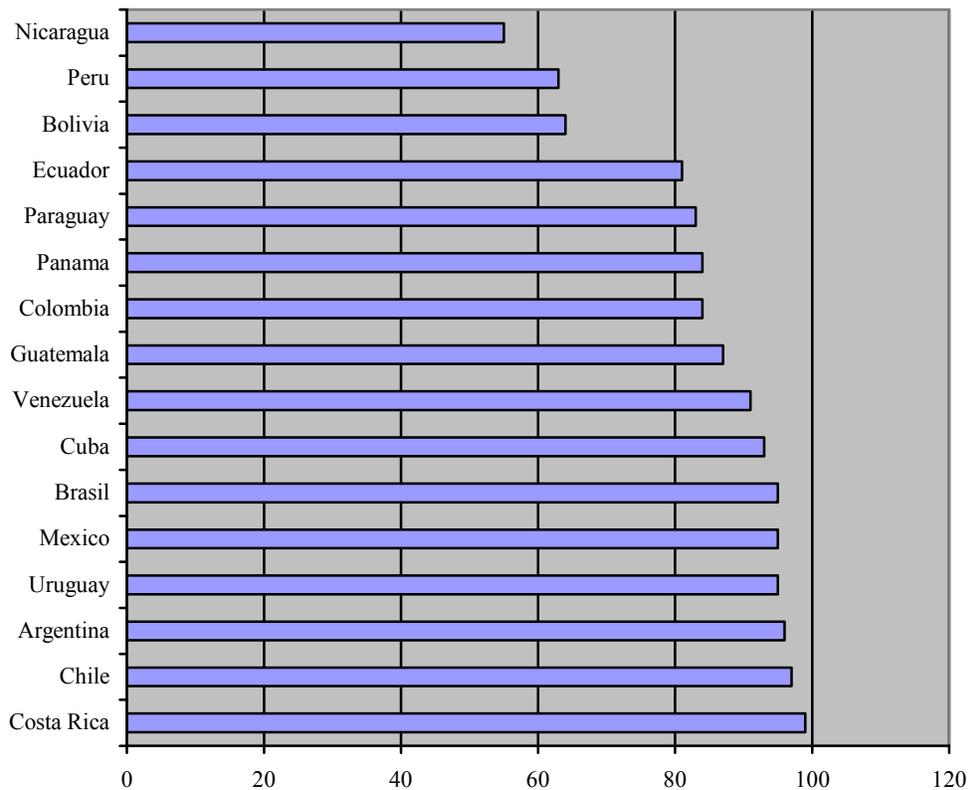


Figure 2: Access of Latin American population to electric service (selected countries from South and Central America*) – households with electricity in 2003 (%)

Source: CEPAL, 2005.

*Countries from Caribbean were included for comparison effect.

4. The challenge of increasing the electricity access of the poor in a sustainable way (economically and environmentally)

Given the importance of electricity as a driving force of social and economic development, almost all Latin American countries are undertaking significant restructuring of the energy sector to ensure a sound and sustainable development of electricity generation, transmission and distribution. As examples, we have Chile (the first one, since 1982) and Argentina (since 1992), who opened and privatized the power market and also Brazil, which, in 1995 began changing its regulatory framework for the energy industry. It began by opening and privatising the industry and with the election of a new Government, in 2003, new changes were introduced to benefit hydropower generation, increase the government's share in the sector and ensure universal access to electricity – the program Light for All was launched (Box 1).

The hydropower potential of Latin America is still underused. The demand for electricity has been systematically increasing in all countries. New sources of renewable energies (wind, biomass, and SPH) are particularly cost-effective for isolated systems, where the cost of new connections to the grid is more expensive (Box 2).

Box 1: Light for All Program

Universal access to electrical energy in Brazil was established by Law No. 10,438/02. It provides a definition of low-income consumers and the consumer is no longer saddled with the financial burden of financing expansion of the energy grid. The concessionaire is now responsible for the costs of meeting demands for supply or load increase

The Law establishes an energy development account to promote universal access and use of renewables. Implementing legislation was enacted by ANEEL (National Electricity Regulatory Agency) imposing on concession and permit holder's targets for full coverage (by 2015).

The program Light for All was launched with the aim of bringing universal access forward to 2008. Due to initial delays in the program, the target for 2004 of 400 thousand new connections was not attained. Nevertheless, Workshop participants related that the problems referred mostly to equipment availability and initial program adjustments. The participants agreed that initial difficulties only related to logistical issues that are most likely to be overcome during the first year of the program.

The program Light for All also provides for the use of energy for productive purposes. One of the issues raised during the workshop referred to the fact that energy concessionaires do not have the role of identifying opportunities for the productive use of energy in the communities they supply with energy. Therefore, it would be important to promote integration of the Light for All program with other Federal or State Government development programs to ensure focus on energy use.

Box 2: COELBA – Rural electrification in the State of Bahia

COELBA (Electrical Energy Concessionaire of the State of Bahia) has been undertaking studies to meet the universal access targets established by the Government under the program Light for All. Using data from a socioeconomic survey of the region, it was ascertained that the number of new connections required would be about 261 thousand and that the target population's monthly expenditure on batteries (for radios) and other lighting products varied from US\$1.6 to 4.8 on average, an amount which the rural consumer could afford to pay for his electricity bill.

The cost of new electrical connections was determined with respect to the distance to the local electricity grid: it was concluded that for new connections at a distance greater than 3km from the grid, the use of photovoltaic panels became feasible, and hence the best option.

The impact on the rates, proportional to the average share this type of consumer has in the market and in current investments, would be around 11.13%.

Discussions that took place during the workshop brought to light the need for ensuring energy to the poor. The difficulties related to servicing the low-income markets, either urban or rural, are intrinsic characteristics of these markets. Low consumption per unit significantly reduces the recovery time for initial investments. This is aggravated, in the case of rural markets, by high dispersion, which requires higher initial investments. On the other hand, in most of the LA countries, concessionaires are not obliged to implement rural electrification and to improve supply to low-income consumers. In fact, competition has not reduced rates and the government has not been able to withdraw from investments in the energy sector

In countries such as Argentina, Peru, El Salvador and Brazil, restructuring of the power sector has led to an increased level of electrification, but this amount is related, in most cases, to a higher level of urban area electrification due to investments in the expansion of the electricity grid. In Brazil, the issue of access to electricity is more of a problem in rural areas than in urban areas. There is a close relationship between poverty and energy access. In Brazil, the regions with the worst levels of access are those with the worst HDI.

In Argentina, Peru and El Salvador the number of new connections a year was reduced and the cost to the poor also increased significantly after the power industry restructuring, as shown in the Table 1 below:

Table 1: Cost of energy for poor people (US\$/month) and rate of electrification (%)

	Pre - reform		Post - reform	
	Cost of energy	Rate of electrification	Cost of energy	Rate of electrification
Argentina	4.35	2.04	11.77	1.03
Peru	6.8	7.8	17.2	5.8
El Salvador	4.8	6.6	16.8	4.1

5. The need to ensure mechanisms through which the poor can have access to electricity

During the Workshop, participants heavily underlined the need to ensure mechanisms through which the poor can have access to electricity. These mechanisms should also create productive conditions for the use of this energy to allow users to pay for the acquired electricity. In sum, a basic question remains: what is the energy for? Energy must provide the population with access to services such as health and education in addition to ensuring the possibility of the use of technologies that facilitate and add value to work.

There are some initiatives underway in this context:

- B-REED, a program sponsored by the United Nations Foundation through UNEP, has been implementing, through E+Co, rural electrification in Brazil, with emphasis on generating sustainable incomes and productive uses. In these projects, the requirements and opportunities for generating renewable energy sources, energy efficiency, solutions for solid wastes and agroindustrial effluents, and solar thermal heating are assessed. Up to now, US\$ 450 thousand have been invested, resulting in the creation of 100 direct jobs, affecting the lives of 825 people. The use of 300 thousand liters of diesel were avoided, corresponding to about 23 thousand avoided tonnes of CO₂;
- At the Equator, in the Amazon region, where the rate of electrification is less than 50%, community productive projects have been set up by micro-enterprises, associations and cooperatives. The SILAE model (rural electrification community enterprises – ECERs) for decentralized rural electrification is seeking ways to contribute to increasing the coverage of basic energy services for the rural equatorial Amazon region. The aim is to encourage access to new information and communication technologies, as a means of strengthening local administration and supporting local productive organizations;
- In the State of Bahia, Brazil, the APAEB (Association for the Sustainable Development of the Sisal Region) has been strengthening local *sisal* production through cooperatives and credit for rural producers since 1985. The poverty equation for the small farmer is the sum of the lack of financial resources, lack of technical support, difficult access to markets and adverse climatic conditions (the area is located in the semi-arid region). APAEB aims to make available the necessary resources (credit), to provide technical assistance, to enable access to more profitable and fair markets and to develop and disseminate technologies suitable to the region's climate. It also invests in educational and social initiatives in the region. Local sustainable development is ensured by the introduction of cultures that are resistant to droughts (goat and sheep herds, plantations, reorganization and integration of small farms), and technical guidance and capacity building. A rotating fund is in place that allows families of the region to finance photovoltaic panels for lighting and pumping of water and for electrical fences for the herds. Results in the local development are visible: in 1990, the per capita income was 28.16 dollars in comparison to 43.4 dollars in 2000: a 54% increase over 10 years;
- CENBIO monitors some projects for plant oils for use in isolated communities. These pilot projects seek to test the financial, technical and operational viability of these systems:

Use of biomass in isolated villages: High costs of electricity produced by these diesel oil engines; not affordable for the local people; potential candidates for CDM projects due to the replacement of diesel oil; significant social benefits, such as night school classes, attended by the whole community;

Use of vegetable oil in isolated villages: *In natura* vegetable oils - adapted diesel engines (use of existing engines); environmental and social advantages; small

communities extract oil from locally available nuts or other vegetable sources; pilot units for small-scale generation (under 200 kW) being tested in remote Amazonian villages;

Biomass gasification in isolated villages: 700 inhabitants - around 180 families; “cupuaçu” plantation: 100 ha; “cupuaçu” pulp sold “*in natura*”, low added-value; diesel consumption for energy production: 300 liters/day; 20 kW gasifier system: production of frozen pulp (higher added value); social benefits: capacity building of human resources, increase of earned income.

Wind Energy: Fernando de Noronha Archipelago; 360 km from the coast (1 hour by plane); 2.000 inhabitants; 1st project (June 1992): 75 kW; 2nd project (May 2000): 225 kW; Partial replacement of diesel.

6. Sustainable development of the power sector: main considerations and/or agreement opinions presented in the Latin America Regional Workshop^{1 2}

- The technical barriers to renewable energy use in Brazilian isolated villages are not so significant. In most cases, it is a matter of adapting technologies already in use in other developing countries. The important aspects in relation to isolated areas are their low electricity demand, the lack of skilled people, and difficulties in properly operating and maintaining power equipment. As a consequence, power systems for these areas must have small capacity and be as simple as possible. Technical assistance and training must also be provided on a long-term basis. As is generally known, the major economic barriers to renewable energy projects include high initial cost and the small-scale production of equipment and system. To overcome these barriers, it is essential to create a market of minimum size and to formulate a comprehensive and long-term policy for renewables. Brazil also needs a policy to encourage renewable energy sources in isolated systems;

- There are favourable conditions for the use of renewable energy sources in Brazil, but the main barriers are: Low income consumer cannot afford the energy services; need for investments in generation and transmission to support the increase in consumption and distribution; low prices offered to local electricity producers; existing subsidies only cover biomass and SHP energy – among economic aspects; lack of specific policies for isolated communities;

¹ In the present section, it was opted a topics form presentation with views to reproducing, in the present report, the wide range of pertinent comments registered in the Latin American Regional Workshop on Electricity & Development in the context of the great theme "sustainable development of the power sector in Latin America".

² In the elaboration of the present section, the analyses of the following participants was used partially or integrally: Profa. Suani Coelho, Prof. Luiz Pinguelli Rosa, Dr. Marcelo Poppe, Dr. Victor Zular, Prof. Gilberto Jannuzzi, Dr. Augusto Jucá, Prof. Osvaldo Soliano Pereira, Dr. Diego Pallares, Dr. Hugo Altomonte, Dr. Giulio Volpi, Dr. Nelson Siffert Filho, Dr. Gabino, Dr. Pedro Bezerra Neto, Prof. Roberto Kozulj, Prof. Gustavo Nadal, Prof. Emilio Lèbre La Rovere, Prof. Luiz Augusto Horta Nogueira and Dr. Franco Aceituno.

- The Light for All Program seeks to use renewable energies only in those places where the cost of connecting to the grid is more expensive (see Box 2). There is considerable potential for using photovoltaic panels, but the costs of some of these connections are prohibitive. In Rio Grande do Norte, studies have shown that some locations would have an electrification cost of about US\$ 32,000 /connection. It was generally agreed in the Workshop that energy concessionaires must employ creativity to meet the demands of these locations. Studies must be undertaken to examine local resources that could be used as input for generating local electricity, thus reducing supply costs. The need for an incentive policy for renewable energy sources in isolated systems was also brought up. Thus, use could be made of certain biomass and plant oil technologies. The subsidies provided for universal access were considered inadequate for meeting the demands of certain locations, especially in the Amazon region. In the State of Bahia, there would be no major problems as the energy concessionaire is well organized and could very possibly meet all demands. But in the northern region, the situation is far more complex;
- Energy distribution goes hand in hand with income distribution. The greater the purchasing power of a certain region, the greater its access to electricity;
- Brazil imports a considerable amount of diesel. Isolated systems use mostly diesel to generate electrical energy. Due to the large distances in the Amazon, the price of transporting diesel to the places where energy is generated wastes more energy than will be used to generate electricity. This region has several forest species that allow the production of biodiesel as a fuel for small generators to meet the needs of populations that are far away from the urban centers of the region. Diesel is highly subsidized (US\$ 1 billion in 2004) by the CCC – Fuel Consumption Account. This subsidy can be applied towards renewable energy sources;
- The use of energy must be emphasized. It is not enough to provide access to energy, but this energy must also be able to be used by the population, that is, the population has to be able to afford to pay for the energy. Universal access programs must take into account the mechanisms for ensuring that this population makes good use of the energy. Electricity is a service, and this service must have continuity. The purchasing power of these populations is very uneven. Brazilian legislation provides for a special rate for low income populations and rate equalization to ensure that the needs of these populations are addressed;
- The issue of efficiency is usually bypassed in the context of expanding the energy access to poor people of Latin America. It has to be said that these populations often have access to old and obsolete technologies. Thus, it is important to pay attention to the issue of energy use;
- Brazil needs a development policy that includes energy that takes into account the problem of income distribution. Biodiesel alone will not solve the issue of

income distribution. There are human resources and technology access issues that need to be considered;

- In Brazil, there is a subsidy for isolated systems called CCC. This subsidy has often been mentioned as the great savior of renewable energies. But, in fact, CCC will reduce operational costs and the major problem with renewables today is the start-up cost. Today CCC represents the greatest weight in the electricity rate – about US\$ 1.1 billion, and it has difficulties in addressing the needs of isolated regions. If we consider the number of communities that still need to receive electrification in the Amazon, be it with diesel or alternative sources, we can see that it is not feasible to use the compensation from this subsidy, it just doesn't add up, there are not enough funds for it. We then have to search for another way, perhaps a program of incentives for renewable energy sources for the isolated system, like PROINFA (renewable energies connected to electricity grid);
- For isolated areas, it is important to start thinking already of a training process and social organization, demonstration and also incentives for local production of equipment for generating renewable energy and integration with a sustainable development program. A universal access program needs not only to be concerned with access, but it must also consider energy use and sustainable development, which cannot be added on to the rate, as it is not the responsibility of the concessionaires. The idea is to encourage new agents to act in this area;
- In Bolivia, the level of overall coverage is about 65%. About 550 thousand households do not have electricity in the rural area. The main technology used to generate electricity is hydropower (45% of the installed capacity) and natural gas thermopower (55% of the installed capacity). For isolated systems, the country has diesel generators and SHPs. There are studies for the use of wind and geothermal energies to supply isolated systems in the Bolivian Amazon. There is an electrification program in Bolivia based on grid expansion and renewable technologies that also envisages the productive use of energy for sustainability purposes. Also, there are several programs underway to identify barriers to rural electrification. A study undertaken with UNDP/GEF shows the institutional, financial and regulatory barriers for renewable energy sources in Bolivia. Another project with CAF deals with grid expansion. Projects for rural electrification are also being studied for telecommunications purposes. With respect to rates, the country has a program called solidarity rate, which is a kind of subsidy for the low income consumer.
- In Argentina, there are significant renewable resources that can be used in the short and medium terms. Sustainable firewood and cattle-raising wastes are the biomass resources with the most potential for meeting energy requirements of the poor. Use of solar energy could also significantly reduce the consumption of conventional fuels for heating, dryers, etc. Wind resources can contribute about 4000 MW linked to the interconnected system and for pumping water. Water resources (small and micro plants) are significant but rarely coincide with the

demand. Some technologies are better placed than others to generate profits and enable productive activities in terms of power, flexibility and cost per unit of energy;

- Chile is divided into 4 electrical systems. Renewable energies have recently been introduced into legislation and there are incentives for SHPs of up to 20 MW, geothermals and wind energy with the aim of diversifying the energy supply mix. As to universal access, targets should be met between 2006 and 2010. There are funds of US\$15 million for this purpose. Furthermore, there are government representatives working together with the Inter-American Development Bank and UNDP in projects that seek to eliminate barriers and encourage renewable energies in rural electrification;
- Most of the Brazilian participants agree that the subsidies for low income populations would be reduced, that there would be changes in the rules and criteria. This has not happened up to now. They said that the Brazilian government has been having difficulties in standardizing social registers to determine who belongs to the low income population³. And this makes it difficult to revise the rules that provide subsidies to all those who consume up to 80 kWh. Probably, in this universe, there are many who do not need subsidies. While this issue is not resolved, subsidies are being given out. Another important issue is adjustment of rates: there are some areas where universal access will have a strong impact on the electricity rates and must be equalized or subsidies must be increased for these areas in order to avoid very large increases for the ordinary consumer;
- Using photovoltaic energy in certain locations is worrisome when we think about sustainability. The sustainability of equipment as regards its maintenance, parts replacement – this is the main lesson we learned from PRODEEM⁴ – is not a question of technology but of management. The management issue is crucial and the Brazilian Ministry of Mines and Energy has been very aware of it in the implementation of the Light for All Program.

7. Conclusions

There are limitations in the energy sector of the Latin America Region. There are limits because of the lack of capacity for raising investments. There aren't, however, limitations

³ Also, there are difficulties in the Brazilian government in defining who is and who isn't poor, what is rural and what is urban. There is a statistical problem, with respect to the definition.

⁴ PRODEEM: a previous program (in relation to the Light for All Program) concentrating on photovoltaic panels. This program had problems, underwent auditing and was concluded. The current administration has sought to recover the equipment and expects to be able to transfer this equipment to concessionaires.

of opportunity if we remember that it's used only of 10% of the current potential in Latin America and there is a ample room to generate more hydropower. The European situation is quite different from that of Latin America.

Several European countries have subsidies that were conceived within a political and technological development policy. It is very different from the context of subsidies in Latin America, which are not conceived within an industrial and technological development policy. The fact is that Subsidies won't solve the problem of poverty; poverty is solved with income.

Restructuring of the power industry in Latin America was often part of a broader macroeconomic structural reform whose indirect impacts on the poor and poverty were more important than the direct effects. For example, in the electrical sector, the company that was privatized increased the number of new connections or legalized connections that were clandestine – this is a positive aspect. The problem is that privatization depends on macroeconomic variables or systems that are unfeasible – where subsidies are covered by producers and not consumers, creating the so-called structural poverty. In Latin America and the Caribbean, in particular, the number of poor people in urban areas at the end of the nineties is 74% higher than the number of the rural poor.

The restructuring process of the power sector in the majority of the Latin America countries was done by offering an attractive cash flow for private capital, So this sector more geared towards reducing deficits and balancing public finances and maximizing the sale price of the privatized companies guarantees of rates that were high enough to compensate the investment.

Energy translates into development. Thus, the energy of the region must achieve an economic and environmental sustainable equilibrium. And it must obtain the most energy benefit without causing major environmental problems. It's not just the importance of energy development and seeking alternative sources of internal energy development, but also seeking energy integration in the region – it's a plus. Cost effectiveness must be taken into account. A case in point is the integration between Colombia and Ecuador, which required investments of US\$ 30 million for the transmission line to Quito, Ecuador. This is a much smaller investment than would be required if a new plant with the same capacity were to be built. And Colombia benefits by selling the energy to Ecuador. Integration is essential and it stands above political issues. More energy means a better quality of life for the population. Its very important to transform this region into an energy powerhouse, after all, 13% of the global energy reserves are concentrated in South America. Venezuela is the world's fifth largest oil producer. Latin America is second in terms of gas in the world. So, all that is needed for negotiating, as a bloc, as a group, is coordination and then to confront the other powerhouses and establish an important market and meet technological demands. If we plan it properly, Latin America can become an energy powerhouse.

In Latin America, the residential consumption represents only 26% of the total electricity consume. Reduce poverty in Latin America is related with the expansion of this share. After all, improve the living conditions of the Latin America population means expanding the access to energy services (to the Latin American households). In that context, some

opportunities can be mentioned: (1) costs of decentralized electric systems (photovoltaic, Aeolian, biomass, etc.) are decreasing; (2) international organizations are open to poverty reduction programs; (3) most are willing to receive electric service.

During the workshop, the main points debated that could be cited in the present section as “conclusions” are:

- ❖ The energy integration of Latin America is fundamental to expand the access of energy services to the poor population of the Region. Of course, that are many other reasons: guarantee the energy independence (from other regions of the world; guarantee the necessary energy offer to permit economic development; etc. It's necessary public and private incentives to the realization of more studies in the area of possibilities to electrification in the Latin America and energy integration of the Region;
- ❖ Considering the expanding process of the electricity demand in Latin America, it's fundamental the implement more and more mechanisms to improve the use of renewables energies in the mix generation of the Latin America countries;
- ❖ An adequate supply of energy is an important key to sustainable economic and social development for the development countries (that includes all Latin America). An essential prerequisite for poverty reduction is the access to such modern energy services as mechanical power to drive irrigation pumps, light to facilitate studying, heat for cooking or refrigeration for the storage of medicines. Besides these poverty-reduction aspects – energy use for income-generating purposes, in social infrastructure institutions and in the domestic sphere – climate protection and preservation of natural resources also play an important role;
- ❖ Expanding the access of electricity (or energy services) to the poor population of Latin America is central to reducing poverty and hunger, improving health, increasing literacy and education and improving the lives of women and children.

ANNEX 1 – Latin America Workshop: Final Agenda

Electricity & Development in Latin America

Final Agenda:

First Day – 13 April, 2005

09:00h- 10:30h	<i>Welcome and Objectives of the Workshop</i> <ul style="list-style-type: none">• Dr. Emilio Lèbre La Rovere, Head of Centro Clima/COPPE/UFRJ• Dra. Suani Coelho, Head of CENBIO/USP• Dr. Augusto Jucá, UNDP/Brazil, Programme Officer, Environment, Energy, Science and Technology Unit• Dra. Cristina Montenegro, UNEP Brazil• Dr. Victor Zular, Secretary of Environmental Quality, Brazilian Ministry of Environment• Dr. Per Kolbeck, Risoe National Laboratory
10:30h- 11:00h	<u>Coffee Break</u>
11:00h- 12:00h	<i>Introduction to the Workshop's Issues</i> <ul style="list-style-type: none">• Prof. Dr. Luiz Pinguelli Rosa, Coordinator PPE/COPPE/UFRJ
12:00h- 12:30h	Questions / Discussion
12:30h- 14:00h	<u>Lunch</u>
14:00h- 14:30h	<i>Electricity and Development: the Investment and Access Challenges Latin America prospects</i> <ul style="list-style-type: none">• Dr. Hugo Altomonte, Latin-American Economic Commission (ECLAC-CEPAL)• Dr. Diego Perez Pallares, Executive Secretary, OLADE - <i>"Electricity: Investment & Access Challenges in Latin América and Caribbean Countries"</i>
14:30h- 15:00h	Questions
15:00h- 15:30h	<u>Coffee Break</u>
15:30h- 16:30h	<i>How to achieve the Target of Universal Access to Electricity in Brazil?</i> <ul style="list-style-type: none">• Dr. Jerson Kelman, General Director, National Power Regulatory Agency, ANEEL (<i>to be confirmed</i>)• Dr. Luis Carlos da Silveira Guimarães, Brazilian Association of

	Power Distribution Utilities (ABRADEE) <ul style="list-style-type: none"> • Dr. Nelson Fontes Siffert Filho , Brazilian National Economic and Social Development Bank (BNDES)
16:30h-17:00h	<i>Discussion</i>
17:00-17:15h	Wrapping up – first day – Prof. Dr. Emilio Lèbre La Rovere

Second Day – 14 April, 2005

09:00h-09:30h	<i>Presentation of the Brazilian Attendance Report on MDGs</i> <ul style="list-style-type: none"> • Dr. Luis Fernando de Lara Rezende - Brazilian Economic and Social Research Institute (IPEA)
09:30h-10h	<i>Poverty and Energy in Brazil</i> <ul style="list-style-type: none"> • Prof. Dr. Roberto Schaeffer, PPE/COPPE/UFRJ
10:00h-10:30h	Questions
10:30h-11:00h	<u>Coffee Break</u>
11:00h-11:45	<i>Electricity Access and Poverty Alleviation:</i> <i>GNESD – First Report : Expanding the Access to Electricity</i> <ul style="list-style-type: none"> • Dr. Roberto Kozulj, Bariloche Foundation – the Latin American Context • Prof. Dr. Emilio La Rovere (Centro Clima) – the Case of Brazil
11:45-12:00h	Questions
12:00h-12:45h	<i>Electricity Access and Poverty Alleviation:</i> <i>GNESD – Second Report : The Role of Renewables in Enhancing Electricity Access for the Poor</i> <ul style="list-style-type: none"> • Dr. Gustavo Nadal, Bariloche Foundation – the Latin American Context • Dr. Suani Coelho (CENBIO) – the Case of Brazil
12:45 – 13:00	Questions
13:00h-	<u>Lunch</u>

14:30h	
14:30h-15:30h	<p><i>Renewable Energy in Latin America : Successful Example and its Potential to Help Reaching Millennium Development Goals</i></p> <ul style="list-style-type: none"> • Dr. Ismael Ferreira – APAEB (Local NGO) • Dr. Hugo Machado – COELBA (Bahia’s Electricity Company) • Dr. Milton Balseca – Servicios de Iniciativa Local para La Amazonia Ecuatoriana (SILAE) - “Rural Electrification Companies (Empresas Comunitarias de Eletrificação Rural – ECER) – an Option to Sustainable Development in Amazonia
15:30h – 16:00h	Questions
16:00h-16:15h	<u>Coffee Break</u>
16:15h-17:15h	<p><i>Renewables in Latin America : Finance, Development, Status, Policies</i></p> <ul style="list-style-type: none"> • Dr. Lucio Felix, E+CO Investment Office (B-REED partner) • Dr. José Vicente Maldonado, CAF (to be confirmed) • Dr. Ricardo Cunha, Brazilian National Economic and Social Development Bank (BNDES)
17:15h-17:45h	Questions
17:45h-18:00h	Wrapping Up – Prof. Dr. Emilio Lèbre La Rovere (Centro Clima/COPPE/UFRJ)

ANNEX 2 – Latin America Workshop: List of participants

1) Adriano Santhiago de Oliveira

Institution: SQA – MMA (ministry of Mines and Energy)

Phone: 55 (61) 4009-1068

E-mail: adriano.oliveira@mma.gov.br

Address: Brasília, Esplanada dos Ministérios, Bloco B, Sala 918

2) Alexandre Davignon

Institution: Centro Clima / COPPE / UFRJ

Phone: 55 (21) 2562-8776 / Fax: 55 (21) 2562-8777

E-mail: davignon@lima.coppe.ufrj.br

Address: Centro de Tecnologia - Bloco I sala 208

3) Alexia de Freitas Rodrigues

Institution: CEPEL

Phone: 55 (21) 2598-6228

E-mail: alexia@ppe.ufrj.br; alexia@cepel.br

Address: Rua Otávio Carneiro 126/703 - Icaraí, Niterói. CEP 24230-190

4) Alvaro Gonzalo Del Castillo Dorado

Institution: Viceministerio de Eletricidad, Energias Alternativas, Telecomunic.

Phone (1): 591-2-211-3858

Phone (2): 591-2-2311010, int. 204

Fax: 591-2-231-2325

E-mail: adelcastillo@oopp.gov.bo; alvaro-delcastillo@yahoo.com.

Address: Av. Mcal. Santa Cruz, Esq. Oruro, Ed. Centro Comunicaciones La Paz, p.13 - La Paz – Bolívia

5) André Felipe Simões

Institution: Centro Clima / COPPE / UFRJ

Phone: 55 (19) 3805-5544 (res.) / 55 (21) 2562-8776 (at work)

E-mail: andrefel@ppe.ufrj.br; a.fsimoies@uol.com.br

Address: Alameda Rio Uatumã, 72 - Mogi Mirim - SP CEP: 13800-970

6) André Ramon Silva Martins

Institution: MME - Coordenador Geral de Desenvolvimento de Políticas Sociais

Phone (1): 55 (61) 319 5012

Phone (2): 55 (61) 319 5727

E-mail: andre.martins@mme.gov.br

Address: Esplanada dos Ministérios, Bloco U, sala 656, Brasília - DF, 70065-900

7) Anibal Rodrigues Ribeiro Silva

Institution: Eletrobras

Phone: 55 (21) 2514-5694

E-mail: anibal@eletrobras.com

Address: Praia do Flamengo, 66 - 5º andar

8) Arnaldo César da Silva Walter

Institution: PSE/FEM/UNICAMP

Phone: 55 (19) 3788-3283

Fax: 55 (19) 3289-3722

E-mail: awalter@fem.unicamp.br

Address: DE / FEM / UNICAMP C.D. 6122 - CEP: 13083-970

9) Augusto César Jucá

Instituição: UNDP

Phone (1): 55 (61) 3038-9038

Phone (2): 55 (61) 8153-7765

Fax: 55 (61) 329-2029

E-mail: ajuca@undp.org.br ; augusto.juca@undp.org.br

Address: Ed. Corporate Center, 7º andar - SCN Quadra 2 Bloco A - CEP: 70712-901

10) Carlos Canales Castañer

Institution: UNDP-GEF-Comision Nacional de Energía

Phone: (56 2) 365-6865

E-mail: ccanales@cne.cl

Address: Agustinas 1291, Piso 7, Of. I - Region Metropolitana - Santiago – Chile

11) Claudia do Valle Costa

Institution: Centro Clima / COPPE / UFRJ

Phone: 55 (21) 2562-8805

Fax: 55 (21) 2562-8805 R: 202

E-mail: cvalle@lima.coppe.ufrj.br

Address: Centro de Tecnologia - Bloco I sala 208 - Cidade Universitária - Ilha do Fundão, Rio de Janeiro – RJ – Brasil

12) Diego Pérez Pallares

Institution: OLADE

Phone: (593 2) 253-1674

Fax: (593-2) 253-1691

E-mail: diego.perez@olade.org.ec

Address: Av. Mariscal Sucre nº N58-63 y Fernández Salvador, Ed. OLADE, Casilla 17-11- 6413 – Equador

13) Eduardo Castelletti

Institution: POLICOM - UPE (Universidade Estadual de Pernambuco)
Phone: 55 (81) 3466-9056
Fax: 55 (81) 3445-3855
E-mail: eduardo@castelletti.com.br
Address: R. Helio Falcão 560/1402 - Boa Viagem - Recife - CEP: 51021-070

14) Emilio Lèbre La Rovere
Institution: Centro Clima / COPPE / UFRJ
Phone (1): 55 (21) 2562-8805
Phone (2): 55 (21) 2562-8759
Fax: 55 (21) 2562-8805 R: 202
E-mail: emilio@ppe.ufrj.br
Address: Centro de Tecnologia - Bloco I sala 208 - Cidade Universitária - Ilha do Fundão,
Rio de Janeiro – RJ – Brasil

15) Felipe Moreira Miranda
Institution: CENBIO / USP
Phone: 55 (11) 3030-6184
Fax: 55 (11) 3091-2649
E-mail: felipemiranda@iee.usp.br; femmiranda@yahoo.com.br
Address: Av. Prof. Luciano Gualberto, 1289 CEP: 05508-010

16) Franco Aceituno Gandolfo
Institution: Comisión Nacional de Energia
Phone: (56-2) 365-6865
Fax: (56-2) 427-9024
E-mail: faceituno@cne.cl
Address: Agustinas n° 1291, Piso 7°, Oficina I, Santiago – Chile

17) Gilberto De Martino Jannuzzi
Institution: International Energy Initiative - IEI
Phone: 55 (19) 3249 0288
Fax: 55 (19) 3289-3125
E-mail: gilberto@iei-la.org
Address: Rua Shigeo Mori, 2.013, CEP 13084-082 – Campinas – SP – Brasil

18) Giulio Volpi
Institution: WWF Latin America Climate and Energy Programme C/o WWF Brasil
Phone (1): 55 (61) 364 7400
Phone (2): 55 (61) 367-3270
Fax: 55 (61) 364 7474
E-mail: giulio@wwf.org.br
Address: SHIS EQ QL 06/08 Conjunto E, 2° andar; Lago Sul 7160-430 Brasília - DF
Brasil

19) Gustavo Nadal
Institution: Fundación Bariloche

Pone: +54 2944 462500
Fax: +54 2944 462500
E-mail: gnadal@bariloche.com.ar; fb@bariloche.com.ar
Address: Beigrano 170 - Bariloche - Rio Negro - CEP 8400 – Argentina

20) Hugo Altomonte
Institution: ECLAC - CEPAL
Phone (1): (56 2) 210-2303 / 210-2257
Phone (2): (56 2) 471-2303 / 471-2257
Fax: (56 2) 208-0252 / 208 1946
E-mail: haltomonte@eclac.cl; hugo.altomonte@cepal.org
Address: Casilla 179-D - Santiago – Chile

21) Hugo Machado Silva Filho
Institution: COELBA
Phone: 55 (71) 3370-5836
E-mail: hugomachado@coelba.com.br
Address

22) Iracema Bouzas Pessoa
Institution: Secretaria de Planejamento do Estado do Rio de Janeiro
Phone (1): 55 (21) 2299-3579
Phone (2): 55 (21) 2299-3547
Fax: 55 (21) 2299-3915
E-mail: iracema@planejamento.rj.gov.br; simonesilva@planejamento.rj.gov.br
Address: Rua da Ajuda, 5 12º andar

23) Ismael Ferreira de Oliveira
Institution: APAEB - Valente
Phone (1): 55 (75) 3263-2181
Phone (2): 55 (75) 3624-3803
Fax: 55 (75) 3263-2236
E-mail: ismael@apaeb.com.br; apaeb@apaeb.com.br
Address: Rua Duque de Caxias, 78 - Centro - Valente - BA - CEP 48890-000

24) José Antônio Simas Bulcão
Institution: Furnas Centrais Elétricas S.A.
Phone (1): 55 (21) 2286-4787 (res)
Phone (2): 55 (21) 2528-4104 (Furnas)
E-mail: bulcao@furnas.com.br/ tonibulcao@superig.com.br
Address: Travessa Visconde de Moraes, 190 CEP: 22260-080

25) Lucio Félix de Souza Neto
Institution: E+Co Brasil
Phone: 55 (71) 3341-5344
Fax: 55 (71) 3341-5344
E-mail: lucio@energyhouse.com

Address: R. Edístio Rondei, 353 Sztep - Salvador - BA - CEP: 41770-395

26) Luis Costa Villegas

Institution: UNDP Chile

Phone (1): 56-2 337-2431

Phone (2): (56 2) 337-2465

Fax (1): 56-2 337-2418

Fax (2): (56 2) 337-2444

E-mail: luis.costa@undp.org

Address: Av. Dag Hammrksold 3241, Vitacura. Santiago – Chile

27) Luis Fernando de Lara Resende

Institution: IPEA

Phone (1): 55 (61) 315-5282

Phone (2): 55 (61) 9975-9202

E-mail: lara@ipea.gov.br

28) Luiz Augusto Horta Nogueira

Institution: Universidade Federal de Itajubá

Phone (1): 55 (35) 3629-1442 / 1311

Phone (2): 55 (35) 3629-1241

Fax: 55 (35) 3629.1265

E-mail: horta@unifei.edu.br

Address: Campus Universitário - Itajubá - MG CEP 37500-903

29) Luiz Pedone

Institution: UFRJ

Phone: 55 (21) 2556-2140

E-mail: lpedone@uol.com.br

Address: Praia do Flamengo, 88/902 - CEP: 22210-030

30) Luiz Pinguelli Rosa

Institution: PPE / COPPE / UFRJ

Phone: 55 (21) 2562-8770

E-mail: lpr@adc.coppe.ufrj.br

Adress: Centro de Tecnologia - Bloco I sala 208 - Cidade Universitária - Ilha do Fundão,
Rio de Janeiro – RJ – Brasil

31) Marcelo Khaled Poppe

Institution: CGEE (Centro de Gestão em Assuntos Estratégicos)

Phone: 55 (61) 424-9629

Fax: 55 (61) 424-9659

E-mail: mpoppe@cgee.org.br

Address: SCN Q.2, Bl. A - Corporate Financial Center, 1102 - CEP: 70712-900

32) Marcos Freitas

Institution: PPE/COPPE/UFRJ

Phone: 55 (21) 2562-8765
E-mail: mfreitas@ppe.ufrj.br
Address: CT Bloco C sala 211
33) Maria Luiza Milazzo
Institution: ELETROBRAS - Chefe da Divisão de Estudos e Planejamento
Phone (1): 55 (21) 2514-5883
Phone (2): 55 (21) 2514-5620
E-mail: milazzo@eletrobras.com
Address: Praia do Flamengo, 66 5º andar

34) Milton Balseca Granja
Institution: CIE / SILAE
Phone: (593 2) 254-1990
Fax: (593 2) 254-1112
E-mail: milton.balseca@energia.org.ec; mbalseca@silae.org.br
Address: Jurn Leon Mera N 26-35 - Centro – Equador

35) Neilton Fidelis da Silva
Institution: IVIG/COPPE/UFRJ
Phone: 55 (21) 2270-1586
E-mail: neilton@ivig.coppe.ufrj.br

36) Nelson Fontes
Institution: BNDES - Chefe do Departamento de Energia Elétrica
Phone: 2172-7848
E-mail: siffert@bndes.gov.br

37) Osvaldo Soliano Pereira
Institution: Universidade de Salvador - UNIFACS
Phone (1): 55 (71) 3330-4662
Phone (2): 55 (71) 3330-4619
Fax: 55 (71) 3330-4666
E-mail: osoliano@unifacs.br
Address: R. Ponciano de Oliveira, 126 - Rio Vermelho - CEP: 41950-175

38) Patricia M. Guardabassi
Institution: CENBIO / USP
Phone: 55 (11) 3030-6184
Fax: 55 (11) 3030-6185
E-mail: sma.pbassi@cetesb.sp.gov.br
Address: Av. Prof. Frederico Hermann Jr., 345 - CEP 05459-000

39) Pedro Bezerra de Carvalho Neto
Institution: CHESF - Companhia Hidroelétrica do São Francisco
Phone: 55 (81) 3229-3549
Fax: 55 (81) 3229-3350
E-mail: pbezerra@chesf.gov.br

Address: R. Delmiro Gouveia, 333 sala C 234 - Recife - CEP: 50761-901

40) Per Kolbeck

Institution: Risoe National Laboratory

Phone: +45 46775131

Fax: +45 46321999

E-mail: per.kolbeck@risoe.dk

Address: Building 142, Frederiksborgvej 399, POBox 49 DK-4000 Roskilde

41) Prof. Geraldo L. Tiago Filho

Institution: Universidade Federal de Itajubá

Phone: 55 (35) 3629-1157

Fax: 55 (35) 629-1265

E-mail: tiago@unifei.edu.br

Address: Campus Universitário - Itajubá - MG CEP: 37500-903

42) Ricardo Cunha

Institution: BNDES

Phone (1): (21) 2277-8653

Phone (2): (21) 2172-8653

E-mail: cunha@ppe.ufrj.br

43) Roberto Kozulj

Institution: Fundación Bariloche

Phone: 54 2944 462500

Fax: 54 2944 462500

E-mail: kozulj@bariloche.com.ar

Address: Calle 17 n° 463 - B.C. de Piedra - Bariloche - Rio Negro - CEP 8400 – Argentina

44) Roberto Schaeffer

Institution: COPPE/UFRJ

Phone: 55 (21) 2562-8769

E-mail: roberto@ppe.ufrj.br

Address: Centro de Tecnologia - Bloco I sala 208 - Cidade Universitária - Ilha do Fundão, Rio de Janeiro – RJ – Brasil

45) Suani Teixeira Coelho

Institution: CENBIO / USP

Phone (1): 55 (11) 3483-6983

Phone (2): 55 (11) 3030-6154 (Secretária)

E-mail: suani@iee.usp.br

Address: Av. Prof. Luciano Gualberto, 1289, São Paulo – São Paulo – Brasil

46) Victor Zular

Institution: Ministério do Meio Ambiente

Phone: 55 (61) 4009-1204

E-mail: victor.zveibil@mma.gov.br