CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT FOR
SMALL SCALE PROJECT ACTIVITIES (SSC-PDD)

BK Energia Itacoatiara Project
Itacoatiara, Brazil

Version: 2005.09.06

Prepared by Ecoinvest

Table of Contents

SECTION A. General description of project activity

A.1. Title of the project activity

BK Energia Itacoatiara Project (hereafter referred to simply as ***BK Itacoatiara Project***).

A.2. Description of the project activity

The project consists in the generation of electricity with a thermoelectric power plant using wood residues from an FSC[1] certified forest management and wood processing company in the city of Itacoatiara, in the State of Amazonas, Brazil. The electricity is generated with a high-pressure boiler (42 bar – 420° C) and a multiple stage condensing steam turbine coupled with a 9 MW_{elt} generator. The power plant replaces several diesel generators and it is the first of its kind in a region supplied by 100% diesel fuelled electrical power generators. For the expected electric energy output (around 56,000 MWh, assuming a 71% capacity factor and having deducted approximated 5,000 MWh own consumption) a Power Purchase Agreement (PPA) with the local power utility (CEAM – "Companhia Energética do Amazonas") is already signed with validity through 2013. With the project CO_2 emissions of 44,094 tons per year are reduced compared to the baseline.

The project was planned by and belonged to a Brazilian Consortium consisting of two companies; Koblitz Ltda. and Brennand Group. The power plant started its operation at the end of 2002 on the site of the Mil Madeireira Itacoatiara Ltda. wood processing plant, which guarantees the supply of wood residues. Mil Madeireira Itacoatiara Ltda. is a subsidiary of Precious Woods Holding Ltd., a company founded in 1990 with the objective of promoting sustainable forest management in Latin America and substituting the demand for tropical wood from deforestation with sustainable produced tropical wood. Precious Woods has set ecological standards in tropical forestry in the past and received a number of environmental awards for its efforts. In 1997, Precious Woods became the first company in the Amazon to receive FSC certification for environmentally friendly and socially responsible forest management.

The power plant consumes wood residues, which are major provided by Mil Madeireira Itacoatiara Ltda. As before the implementation of the project the sawmill had no other option available to safely eliminate the wood waste generated in the production process, these were stored in several sawdust and wood residues stockpiles, which represented a major environmental and safety problem. A second component of the project is thus related to the substantial reductions in methane emissions from the wood waste, which used to be left to decay.

After withdrawal of the previous investors for financial reasons the Precious Woods Group, who formerly acted only as supplier of the combustible, agreed in December 2004 to acquire a majority share

[1] The Forest Stewardship Council (FSC) is an international non-profit organization, founded in 1993 to support environmentally appropriate, socially beneficial, and economically viable management of the world's forests.

of the plant in order to assure ongoing operation. The core justification for this investment by the Precious Woods Group was the potential monetization of CERs to deliver a sustainable and appropriate return.

By switching from electricity generation with diesel to biomass and avoiding methane emissions from biomass decay, the project activity reduces emissions of greenhouse gases (GHG) in the order of 166,847 tons of CO2e per year. Being an indigenous and cleaner source of electricity the project will also provide an important contribution to the local environment, improve the supply of electricity and contribute to the regional economic development. As a local, small-scale biomass power plant, in contrast with the conventional diesel fired plants, the project provides further transmission and distribution benefits including:

- Increased reliability, shorter and less extensive outages
- Lower reserve margin requirements
- Improved power quality
- Reduced lines losses
- Reactive power control
- Mitigation of transmission and distribution congestion, and
- Increased system capacity with reduced T&D investment.

Additional social benefits of the project are related to local job creation and a better income distribution in the region. The local municipality benefits from lower expenditures as it no longer has to import diesel or electricity from other regions. This funding may therefore be spent in other key areas such as health and education, which will directly benefit the local population.

Beyond the reduction of GHG emissions the project's environmental benefits are related to the sourcing of the wood waste combustible from 311,000 hectares of sustainable managed and FSC certified forest near the project site in Itacoatiara. Sustainable means harvesting not more than 15 to 20 m³ per hectare during the full rotation cycle of 25 years, applying low-impact logging techniques, which preserve the surrounding flora undamaged and the forest canopy mostly intact, protecting all rivers, creeks, banks and slopes as ecologically attractive areas permanently free from any economic use, and setting aside as absolute preservation areas approximately 25% of the forest surface, as well as controlling the access to the forest to prevent illegal deforestation, hunting of endangered species, and fire outbreak. As a result the integrity of the forest as well as its ecological functions will be preserved in the long term. On a national scale the project will give an important signal to other parties potentially interested in starting similar electricity generation projects fuelled with wood waste sourced from sustainable managed forests.

Wood residues have come from three different types of sources (sawmill, clearing roads, and landfill). Project participants monitor the origin of the biomass burned in the power plant. The historic of the fuel burned since the operation start in 2002 up to and including May 2005 is presented in Table 5.

A.3. Project participants

Detailed contact information on party(ies) and private/public entities involved in the project activity listed in Annex 1.

Table 1 – Party(ies) and private/public entities involved in the project activity

Party involved	Private and/or public entities project participants	Project participant?
Brazil (host)	Public entity: Comissão Interministerial de Mudança Global do Clima	No
	Private entity: BK Energia Itacoatiara Ltda.	Yes
	Private entity: Ecoinvest	No

Credit owner and project operator is the special purpose company BK Energia Itacoatiara Ltda., is author and the responsible for all activities related to the project management, registration, monitoring, measurement and reporting.

A.4. Technical description of the project activity

BK Energia Itacoatiara Ltda. is a special purpose company[2] set up to use residues from the FSC-certified operations of the wood processing company Mil Madeireira Itacoatiara Ltda., in the city of Itacoatiara, State of Amazonas, north of Brazil.

Biomass power conversion technologies for electricity production can be broadly categorized into direct combustion technologies, gasification technologies, and pyrolysis. Direct combustion technologies, as applied in the Itacoatiara facility, are the most widely known option for power generation and/or heat production from biomass. It involves the oxidation of biomass with excess air in a process that yields hot flue gases that are used to produce steam in boilers. The steam is used to produce electricity in a Rankine cycle. The Rankine cycle is a heat engine with a vapor power cycle. The working fluid is water. Typically, electricity is only produced in a “condensing” steam cycle, while electricity and steam are co-generated in an “extracting” steam cycle.

The power plant consists of a high pressure boiler (42 bar – 420° C) and a multiple stage condensing steam turbine coupled with a 9 MW_{el} generator with an expected electricity output of around 56,000 MWh (assuming a 71% capacity factor and having deducted approx. 5,000 MWh own consumption). The project replaces diesel generation and covers around 70% of the electricity demand in the city of Itacoatiara.

Specification of components and measurement equipments follows:

[2] Owned 80% by Precious Woods Holding Ltd. and 20% by Koblitz Ltda. Precious Woods Holding Ltd. is the Swiss Holding company of Mil Madeireira Itacoatiara Ltda, which provides the biomass for the power plant. Precious Woods was founded in 1990 with the objective of promoting sustainable forest management in Latin America and substituting the demand for tropical wood from deforestation with sustainable produced tropical wood. Koblitz Ltda. is a 100% Brazilian EPC[2] contractor operating since 1975 in the area of energy systems, with solid know-how in industrial generation and cogeneration. Koblitz features a portfolio of over 200 projects, including many power plants using renewable energy sources.

- Turbine manufactured by Dresser-Rand, model ET1HB7, serial number ET-103, rated capacity 9,000 KW_{el} (10,000 KVA) at 5,000 rpm;
- Boiler manufactured by Equipalcool, model 45 V-2-S, serial number 059-01, feed water temperature 105 ^oC, rated capacity 45,000 kg/h of steam at 42 kgf/cm^2 and 420 ^oC, biomass residues (wood chips) fuelled, LHV efficiency 85.7%;
- Electrical generator manufactured by Toshiba, type TABL RCC, serial number 0110371000, rated capacity 10,000 kVA at 13.8 kV, 60 Hz;
- Scale 1 (the one used to weight the total of wood residues that enter in the boiler) manufactured by Toledo, model 9270, TAG number PL 1200, Maximum capacity 75t/h, code 9270/1X-12-Z-40; and
- Scale 2 (the one used to weight wood residues that come from outside) manufactured by Toledo, model 820, Capacity 60t, and 8 load cells.

A.4.1. Location of the project activity

A.4.1.1. Host Party(ies)

Brazil

A.4.1.2. Region/State/Province etc.

State of Amazonas

A.4.1.3. City/Town/Community etc

Itacoatiara

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity

The project is located on the north region of Brazil, state of Amazonas, municipality of Itacoatiara. Itacoatiara is a city with 78,425 inhabitants and 8,892 km² of territorial extension (IBGE, 2004). The city is located at the bank of the Amazon River, 240 kilometres east of Manaus, the capital of the state of Amazonas (See Figure 1).

Itacoatiara geographical coordinates are: latitude 03^o 08’ 35” South, longitude 58^o 26’ 39” West.

A.4.2. Type and category(ies) and technology of project activity

Component 1, power generation: type I, renewable energy projects; category I.D – renewable electricity generation for a grid

Component 2, methane emissions avoidance: type III, other project activities; category III.E – avoidance of methane production from biomass decay through controlled combustion

Both project components are eligible under the simplified procedures for small-scale CDM project activities.

For component 1, the power plant has 9 MW of nominal installed capacity (below the eligibility limit of 15 MW).

From AMS I.D: “*If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires [non-] renewable biomass and fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW ... Biomass combined heat and power (co-generation) systems that supply electricity to a grid are included in this category. To qualify under this category, the sum of all forms of energy output shall not exceed 45* $MW_{thermal}$*. E.g., for a biomass based co-generating system the rating for the primary boiler shall not exceed 45* $MW_{thermal}$”.

Although the project activity and is not a heat and power system, for the sake of conservativeness the calculation of the thermal capacity of the boiler follows:

- Output steam: 42 kgf/cm^2, 420ºC, specific enthalpy[3] = 3,260 kJ/kg
- Input water: 45 kgf/cm^2, 105ºC, specific enthalpy = 441 kJ/kg
- Steam production: Maximum 50,000 kg/h
- Thermal Capacity = [50,000 × (3,260 - 441)] ÷ 3,600
- Thermal Capacity = 39.1 $MW_{thermal}$ (smaller than 45 $MW_{thermal}$)

For component 2, the emissions directly related to the activity related to project activity, i.e., from the combustion of the biomass are of around 8,000 tCO_2e annually (below the eligibility limit of 15,000 tCO_2e annually). The calculation of the emissions directly related to the project is detailed below.

To calculate the emissions that are attributable to the project one needs the total amount of biomass annually used by the thermo plant (about 110,000 tonnes of wood residues) and the energy content of the biomass ($9.63 \cdot 10^{-3}$ TJ/t, determined through regular calorimetric tests with wood residues form the region). The numbers shall be applied to the following formula:

[3] **Moran, M. J. and H. N. Shapiro (2002).** *Princípios de termodinâmica para engenharia.* Livros Técnicos e Científicos Editora S.A. Rio de Janeiro (Brasil).

$PE_y = Q_{biomass} \times E_{biomass} \times (CH_4bio\_comb \times CH_4\_GWP + N_2Obio\_comb \times N_2O\ \_GWP) \div 10^6$

Where:

- PE_y is the project activity emissions (kilotonnes of CO_2 equivalent),
- $Q_{biomass}$ is the quantity of biomass treated under the project activity (tonnes)
- $E_{biomass}$ is the energy content of biomass (TJ/tonne)
- CH_4bio_comb is the CH_4 emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kg of CH_4/TJ, default value is 300)
- CH_4_GWP is the GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4, default value is 21)
- N_2Obio_comb is the N_2O emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kg/TJ, default value is 4)
- N2O_GWP is the GWP for N2O (tonnes of CO2 equivalent/tonne of N2O, default value 310)
- $PE_y = 110{,}000 \times 9.63 \cdot 10\text{-}3 \times (300 \times 21 + 4 \times 310)/10^6 = 7.987$ ktCO2e
- PE_y = 7,987 tCO2e

A.4.3. Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity

This project activity replaces diesel fuelled by renewable and sustainable biomass residues fuelled electricity generation. The city of Itacoatiara is not linked to the Brazilian interconnected power grid. An isolated system powered by diesel generators provided electricity to the city before the implementation of the project activity. With the project activity diesel generation was replaced and CO_2 emissions reduced.

The project also avoids emissions of methane given that the biomass used for electricity generation would otherwise be left in open field stockpiles and, therefore, resulting in an anaerobic decay.

A.4.4. Public funding of the project activity

No public funding is or will be required for the development of the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity

The project consists of one single power plant with an installed capacity of $9MW_{elt}$ and is not component of other project activity.

SECTION B. Baseline methodology

B.1. Title and reference of the project category applicable to the project activity

Component 1, power generation: AMS type I, renewable energy projects; category I.D – renewable electricity generation for a grid.

Component 2, methane emissions avoidance: AMS type III, other project activities; category III.E – avoidance of methane production from biomass decay through controlled combustion.

B.2. Project category applicable to the project activity

Component 1, power generation: scope 1, energy industries (renewable-/non-renewable sources).

Component 2, methane emission avoidance: scope 13, waste handling and disposal.

B.3. Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity

The project fulfils all the “additionality” prerequisites (see application of the “tool for the demonstration and assessment of additionality[4]”, hereafter referred to simply as “additionality tool,” below) demonstrating that it would not occur in the absence of the CDM.

The “additionality tool” shall be applied to describe how the anthropogenic emissions of GHG are reduced below those that would have occurred in the absence of the Itacoatiara Project. The additionality tool provides a general step-wise framework for demonstrating and assessing additionality. These steps, numbered from 0 to 5, include:

0. Preliminary screening
1. Identification of alternatives to the project activity
2. Investment analysis AND/OR
3. Barrier analysis
4. Common practice analysis
5. Impact of CDM registration

The application of the additionality tool to the Itacoatiara Project follows.

[4] *Tool for the demonstration and assessment of additionality.* UNFCCC, CDM Executive Board 16th Meeting Report, 22 October 2004, Annex 1.

Step 0. Preliminary screening based on the project start date:

a) **Project Start date:** The beginning of the commissioning phase, October 2002, is considered the starting date of the project activity. The commercial start-up occurred in November 2002 when the power plant delivered its first MWh of electricity to the grid of the city of Itacoatiara.

b) **Evidence demonstrates that CDM incentives were seriously considered in the development of project:** BK Energia Participações Ltda., a partnership between Koblitz Ltda. (Koblitz) and Brennand Group developed the BK Energia Itacoatiara Project.

Since 2000, Koblitz has formed several partnerships in order to invest in renewable energy projects throughout Brazil. In partnership with the Brennand Group, Koblitz developed the following renewable energy projects: Arapucel (small-hydro), Uruguaiana (rice husk fueled thermal power plant) and the BK Energia Itacoatiara Project. In another partnership with C.G.D.e, the Brazilian energy branch of the Portuguese bank Caixa Geral de Depósitos, one of the projects developed is the Piratini, C.G.D.e, Koblitz Energia S.A. (Piratini Project). In the second half of 2000, Koblitz requested from the Brazilian government, through Ecoinvest, a position regarding its participation in the Clean Development Mechanism. In April 2001, the project received a non-objection letter from the Brazilian government (Figure 2) and in the beginning of 2002, Piratini, through Ecoinvest, negotiated 1,600 tCO_2e verified emission reductions with the Canadian government. The Piratini project, which is currently fully controlled by Koblitz, is the first project registered (V-AAA-001) in the Canadian GHG Reductions Registry (http://reductions.vcr-mvr.ca/rer_masterprojects_e.cfm). Through their experience with the Piratini project, Koblitz Ltda. developed the human capital and internal capabilities to apply CDM principles to future projects. By the end of 2000, all possible ventures by Koblitz using renewable energy sources were analysed in order to evaluate their eligibility under the CDM, specifically the development of the BK Itacoatiara Project. Although enormous uncertainties were presented at the time, such as the entry into force of the Protocol, size of the market/price of the CERs, no nominated executive board, lack of approved baseline/monitoring methodologies and so on, the project owners took the risk and seriously considered the incentive from the CDM in the decision to proceed with the activity.

Step 1. Identification of alternatives to the project activity consistent with current laws and Regulation

Sub-step 1a. Define alternatives to the project activity:

Alternative 1: Continuation of the current situation: Before the BK Itacoatiara project was developed Itacoatiara's isolated electricity system was fully supplied by diesel.

In the year of 2002 the following sources supplied the total demand of 60,678 MWh in Itacoatiara's isolated system:

- CEAM – 28,877 MWh (diesel)
- Hermasa[5] (self-generator) – 31,801 MWh (diesel)

[5] Hermasa – Hermasa Navegação da Amazonia S.A

Alternative 2: The implementation of the project: According to the "*Operation Plan 2004 - Isolated Systems*" (Eletrobrás, 2004), the forecasted demand of the Itacoatiara systems was 80,908 MWh, to be supplied by the following sources:

- BK Itacoatiara – 54.000 MWh (biomass)
- CEAM – 21.472 MWh (diesel)
- Hermasa (self-generator) – 5.436 MWh (diesel)

Sub-step 1b. Enforcement of applicable laws and regulations:

The CEAM and Hermasa generators still operate during peak load hours. Both the project activity and the alternative scenario are in compliance with all applicable regulations.

Step 3. Barrier Analysis:

To substantiate the barrier analysis a brief overview of the Brazilian electricity market in the last years is first presented.

Until the beginning of the 1990's, the energy sector was composed almost exclusively of state-owned companies. From 1995 on due to the increase of international interest rates and the lack of investment capacity of the State, the government was forced to look for alternatives. The solution recommended was to initiate a privatization process and the deregulation of the market.

The four pillars of the privatization process initiated in 1995 were:

- Building a competition friendly environment, with the gradual elimination of the captive consumer. The freedom of choice of the electricity services supplier, initiated itself in 1998 for great consumers, and should culminate with a 100% free market in 2006;
- Dismantling of the state monopolies, separating and privatizing the activities of generation, transmission and distribution;
- Allowing free access to the transmission lines, and
- Placing the operation and planning responsibilities to the private sector.

At the same time three entities were created, the Electricity Regulatory Agency, ANEEL set up to develop the legislation and to regulate the market; the National Electric System Operator, ONS, to supervise and control the generation, transmission and operation; and the Wholesale Electricity Market, MAE, to define rules and commercial procedures of the short-term market.

Until the end of 2000, after five years of privatization, the process results were still modest (Figure 3). Despite high expectations, investments in new generation did not follow the increase in consumption.

The decoupling of GDP (average of 2% increase in the period of 1980 to 2000) from electricity consumption increase (average of 5% increase in the same period) is well known in developing countries, mainly due to broadening of the supply services to new areas and the growing infra-structure. The necessary measures to prevent bottlenecks in services were taken. These include an increase of generation capacity higher than the GDP growth and strong investments in energy efficiency. In the Brazilian case, the increase in the installed generation capacity (average of 4% in the same period) did not follow the growth of consumption as can be seen in Figure 4.

Without new installed capacity, the only alternatives were energy efficiency improvements or higher capacity utilization (capacity factor). Regarding energy efficiency, the government established in 1985 PROCEL (the National Electricity Conservation Program). Although the results of the program were remarkable, the efficiency achievement was not big enough to cover the mentioned gap between the need of new generation capacity and consumption growth.

The remaining alternative, to increase the capacity factor of the old plants, was actually the most widely used, as can be seen in Figure 5. To understand if such increase in capacity factor brought positive or negative consequences one needs to analyze the availability and price of fuel. In the Brazilian electricity model the primary energy source is the water accumulated in the reservoirs. Figure 6 shows what happened to the levels of "stored energy" in the reservoirs from January 1997 to January 2002. It can be seen that reservoirs which were planned to withstand 5 years of less-than-average rainy seasons, almost collapsed after a single season of low rainfall (2000/2001 experienced 74% of the historical average rain. This situation depicts a very intensive use of the country's hydro resources to support the increase in demand without increase of installed capacity. Under the situation described there was still no long-term solution for the problems that finally caused shortage and rationing in 2001.

Aware of the difficulties since the end of the 1990's, the Brazilian government signalized that it was strategically important for the country to increase thermoelectric generation and consequently be less dependent of hydropower. With that in mind the federal government launched in the beginning of the year of 2000 the *Thermoelectric Priority Plan* (*PPT*, "*Plano Prioritário de Termelétricas*", Federal Decree 3,371 of February 24th, 2000, and Ministry of Mines and Energy Directive 43 of February 25th, 2000), originally planning the construction of 47 thermo plants using Bolivian natural gas, totalizing 17,500 MW new installed capacity until December of 2003. During 2001 and the beginning of 2002 the plan was rearranged to 40 plants and 13,637 MW to be installed until December 2004 (Federal Law 10,438 of April 26th, 2002, Article 29). As of today, December 2004, 20 plants totalizing around 9,700 MW are operational.

During the rationing of 2001 the government also launched the *Emergency Energy Program* with the short-term goal of building 58 small to medium thermal power plants until the end of 2002 (using mainly diesel oil, 76,9 %, and residual fuel oil, 21.1 %), totalizing 2,150 MW power capacity (CGE-CBEE, 2002).

It is clear though that hydroelectricity is and will continue as the main source responsible for the electricity base load in Brazil. However, most if not all-hydro resources in the South and Southeast of the country have been exploited, and most of the remaining reserves are located in the Amazon basin, far from the industrial and population centers (OECD, 2001). Clearly, new additions to Brazil's electric power sector are shifting from hydroelectricity to natural gas plants (Schaeffer *et al.,* 2000). With discoveries of vast reserves of natural gas in the Santos Basin in 2003 (Figure 7) the policy of using natural gas to generate electricity remains a possibility and it still will continue to have interest from private-sector investments in the Brazilian energy sector.

In power since January 2003, the new elected government decided to fully review the electricity market institutional framework. A new model for the electricity sector was approved by Congress in March 2004. The new regulatory framework for the electricity sector has the following key features (OECD, 2005):

- Electricity demand and supply will be coordinated through a "Pool" Demand will be estimated by the distribution companies, which will have to contract 100 per cent of their projected electricity demand over the following 3 to 5 years. These projections will be submitted to a new institution (*Empresa de Planejamento Energético*, EPE), which will estimate the required expansion in supply capacity to be sold to the distribution companies through the Pool. The price at which electricity will be traded through the Pool is an average of all long-term contracted prices and will be the same for all distribution companies.
- In parallel to the "regulated" long-term Pool contracts, there will be a "free" market. Although in the future, large consumers (above 10 MW) will be required to give distribution companies a 3-year notice if they wish to switch from the Pool to the free market and a 5-year notice for those moving in the opposite direction a transition period is envisaged during which these conditions will be made more flexible. These measures have the potential to reduce market volatility and allow distribution companies to better estimate market size. If actual demand turns out to be higher than projected, distribution companies will have to buy electricity in the free market. In the opposite case, they will sell the excess supply in the free market. Distribution companies will be able to pass on to end consumers the difference between the costs of electricity purchased in the free market and through the Pool if the discrepancy between projected and actual demand is below 5 per cent. If it is above this threshold, the distribution company will bear the excess costs.
- The government opted for a more centralized institutional set-up, reinforcing the role of the Ministry of Mines and Energy in long-term planning. EPE will submit to the Ministry its desired technological portfolio and a list of strategic and non-strategic projects. In turn, the Ministry will submit this list of projects to the National Energy Policy Council (*Conselho Nacional de Política Energética*, CNPE). Once approved by CNPE, the strategic projects will be auctioned on a priority basis through the Pool. Companies can replace the non-strategic projects proposed by EPE, if their proposal offers the same capacity for a lower tariff. Another new institution is a committee (*Comitê de Monitoramento do Setor Elétrico*, CMSE), which will monitor trends in power supply and demand. If any problem is identified, CMSE will propose corrective measures to avoid energy shortages, such as special price conditions for new projects and reserve of generation capacity. The Ministry of Mines and Energy will host and chair this committee. No major further privatizations are expected in the sector.

Although one of the new model biggest aims is to reduce market risk, its ability to encourage private investment will depend on how the new regulatory framework is implemented. Several challenges are noteworthy in this regard. *First,* the risk of regulatory failure that might arise due to the fact that the government will have a considerable bigger role to play in long-term planning should be avoided by close monitoring of new rules applicability. *Second,* rules will need to be designed for the transition from the current to the new model to allow current investments to be rewarded adequately. *Third,* because of its small size, price volatility may increase in the short-term electricity market, in turn bringing about higher investment risk, albeit this risk will be attenuated by the role of large consumers. The high share of hydropower in Brazil's energy mix and uncertainty over rainfall also contribute to higher volatility of the short-term electricity market. *Fourth,* although the new model will require total separation between generation and distribution, regulations for the unbundling of vertically-integrated companies still have to be defined. Distribution companies are currently allowed to buy up to 30 per cent of their electricity from their own subsidiaries (self-dealing). *Finally,* the government's policy for the energy sector needs to be defined within a specific sectoral framework.

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity

Investment Barrier

It is difficult to develop an accurate investment analysis in Brazil without taking into account the Brazilian Prime Rate, known as SELIC rate, as well as the CDI – Interbank Deposit Certificate that leads the short-term credit market. Real interest rates have been extraordinarily high since the Real plan stabilized inflation in 1994.

As a consequence of the long period of inflation, the Brazilian currency experienced a strong devaluation, effectively precluding commercial banks from providing any long-term debt operation. The lack of a long-term debt market has had a severely negative direct impact on the financing of energy projects in Brazil.

Interest rates for local currency financing are significantly higher than for US Dollar financing. The National Development Bank – BNDES is basically the only supplier of long-term loans. Debt funding operations from BNDES are made primarily through commercial banks. As the credit market is dominated by shorter maturities (90-days to 01-year) there are rare long-term credit lines being made available except for the strongest corporate borrowers and for special government initiatives. Credit is, thus, restricted to the short-term in Brazil or the long-term in dollars offshore.

The longest maturity for which there is a financial domestic market varies with circumstances and the perception. In Brazil, rare were the moments in which this term was over one year and in moments of stress the duration of savings instruments contracted drops to levels close to one day by massive concentration on overnight banking deposits. Savers do not accept to hold long-term financial contracts due to the impossibility to price-in the uncertainty involved in the preservation of the purchasing power value of financial contracts over longer time periods (Arida, Bacha & Lara Resende, 2004).

The inexistence of a local long-term market results not from a lack of financial investment opportunities, but from the reluctance of creditors and savers to lengthen the horizon of their placements. It has made savers look for the most liquid form and place their money in short-term government bonds instead of investing in long-term opportunities that could finance infrastructure projects.

The most liquid government bond is the LFT (floating rate bonds based on the daily Central Bank reference rate). As of January 2004, 51.1% of the domestic federal debt was in LFTs that has duration of one day. This bond rate is almost the same as the CDI - Interbank Deposit Certificate rate that is influenced by the SELIC rate, defined by COPOM[6].

The SELIC Rate (Figure 8) has been oscillating since 1996 from a minimum of 15% p.a. in January 2001 to a maximum of 45% p.a. in March 1999.

The project was developed on a project finance basis. To finance construction, the project developer took advantage from the financing lines of BNDES. This financial support covered 80% of the

[6] COPOM – Comitê de Politica Monetária (Monetary Policy Commitee)

project costs with a rate of TJLP (BNDES Long Term Interest Rate – 10%) plus a 5% spread risk for a term of 8-year and 1-year grace period.

As can be seen in the worksheet FCF_BK Itacoatiara(CER).xls[7], the Project was set up with an expected financial IRR – Internal Rate of Return of the 13,43% per year. The project's IRR is lower than SELIC rate even tough it corresponds to a riskier investment compared to a Brazilian government bonds. The inclusion of the revenues from CERs makes the project's IRR increase approximately 1,800 basis point from 13,43% to 31,66% (Figure 9). Such increase in return would compensate for the additional risk an investor would enter into with this project.

With the increase of 1800 basis point the CER revenues would bring the project additional benefits due to the fact that they are generated in hard currencies (US Dollar or EURO). The additional revenue allows the project investor to hedge its debt cash flow against currency devaluation. Moreover, the CER Free Cash Flow, in US dollars or EURO, could be discounted at an applicable lower interest rate, thus increasing the project leverage.

The conclusion is that the CDM incentive plays a very important role in overcoming financial barriers. Figure 9 shows the CER revenues influence in the project NPV and IRR.

Cultural Barrier

The isolated system of the city of Itacoatiara has been supplied for many years by CEAM. The diesel generators were the only source of electricity in the city. The switch to a new electricity source, provided by the sawmill, has faced mistrust from the local population. They did not understand that electricity could be supplied by biomass, nor did they trust that it would be reliable.

Other cultural barrier faced by the project was the resistance of some NGOs. They did not support the project activity until they understood that the project does not promote deforestation but promotes sustainable development through integration with a fully FSC certified forestry operation, which has been specifically supported by Greenpeace and the World Wildlife Fund since inception.

Lack of Infrastructure

The region where the project is located is an isolated and underdeveloped area. There is a lack of infrastructure such as roads, reliable electricity, communication and transport. The project sponsors had to develop some of these facilities before the implementation of the project. In addition there were no qualified personnel available in the region due to the lack of schools and universities.

Institutional Barrier

As described above, since 1995 government electricity market policies have been continuously changing in Brazil. Too many laws and regulations were created supposedly to organize and to incentive new investments in the energy sector. Obviously the result of such unstable regulatory environment was rather the contrary. During the rationing period the prices surpassed the value of BRL 600/MWh (around USD 200/MWh) and the forecasted marginal price of the new energy was at around BRL 120 to 150/MWh (around USD 45). In the middle of 2004 however, the average price was below BRL 50/MWh (less than USD 20/MWh). The volatility of the electricity price in Brazil has a correlation with the instability in government policies in the period, with 3 different regulatory environments in a 10-year

[7] The worksheet is available upon request

period (from 1995 to 2004). In theory the new regulatory framework has the potential to reduce market risk considerably. Nevertheless only time will prove the efficiency of the new model in relation to market risks reduction and private investment attraction[8]. In that sense, it will be interesting to evaluate the results of the first auction of licenses for the construction of new power plants in order to correctly assess the success of the implementation of the new regulatory framework.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives:

The alternative to the project activity was to keep the diesel based power generation at the isolated system in Itacoatiara. As the barriers mentioned above are applicable only the proposed project activity, nor there was no obstacle to keep the current situation as would be safer to maintain the status quo.

Step 4. Common practice analysis:

S***ub-step 4a. Analyze other activities similar to the proposed project activity***

In the state of Amazonas and other states in the Amazon region over 90% of the electricity is supplied with diesel generators in several isolated systems. CEAM9, the utility company that generates and distributes electricity to the isolated systems in the state of Amazonas, has 88-isolated systems under its operation.

In these systems the company currently operates 368 diesel generators with 212 MW total installed capacity. In Itacoatiara alone, the biggest isolated system, the company has seven diesel generators with 21MW of installed power capacity, which nowadays operate only during the peak hours due the fact that BK Itacoatiara covers most of the demand. In 2004 CEAM generated 665.727 MWh and consumed around 200 millions liters of diesel.

There is no other project delivering electricity to an isolated grid system replacing diesel with biomass. In the vast area of the Amazon region there are many small and independent biomass boilers but none of them is delivering electricity to an isolated system, and no one is supplied with biomass from sustainable, FSC certified sources. There is no information publicly available about any company producing electricity for internal demand.

Sub-step 4b. Discuss any similar options that are occurring

There are other wood chip fired power plants in Brazil being developed as CDM projects. They are concentrated in the South/South-East regions of the country.

However, none of these projects is switching from diesel generation in large scale and none of them is using biomass originating from sustainable, FSC certified forest management.

Step 5 – Impact of CDM Registration

The CDM has made possible to set up a power plant and export electricity to the isolated Itacoatiara grid and switch from diesel generation. CDM revenues improve the project's rate of return

---

[8] The reform of the legal framework of the Brazilian electricity sector started with Provisional Measure No. 144, later converted into Law No. 10,848, of 15 March 2004 - was unveiled with the publication of Decree No. 5,163, of 30 July 2004.

[9] CEAM – Companhia Energética do Amazonas

from 13.43 % to an acceptable 31.66%, which is necessary to initiate such pioneering projects with several partners involved and to guarantee their operation in the long term. Without the prospect of CERs revenues it is very unlikely that the project would have been implemented. Despite of the huge uncertainties project owners took the risk to finance the project and counted with the CERs revenues to overcome the above described cultural, institutional and financial barriers. The registration of the proposed project activity will have a strong impact not only rewarding the belief of the project owners in the Kyoto Protocol as well as it will pave the way for similar biomass projects to be implemented in the vast area of the Amazon rainforest. It will contribute to the recognition of renewable energy supply in the Amazon and promote the sustainable and intelligent use of the forest. This recognition is confirmed by the board of the Precious Woods Group, which has already signalized the intention to mobilize further capital to secure and expand the operations based on the availability of CDM revenues for such projects in Brazil.

B.4. Description of the project boundary for the project activity

According to the chosen methodology[10] the project boundary is the physical, geographical site where the treatment of biomass takes place (Figure 10).

This includes the power plant, as well as the diesel power generation units that provide the electricity to the isolated grid of Itacoatiara in the baseline scenario.

The Simplified modalities and procedures for small–scale clean development mechanism project activities further explain: The project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases (GHG) **under the control of the project participants** that are significant and **reasonably attributable to the CDM project activity.**

The Guidelines for Completing CDM-PDD, CDM-NMB and CDM-NMM further explains: the (Meth Panel) shall develop specific proposals for consideration by the Executive Board on how to operationalize the terms “under the control of”, “significant” and “reasonably attributable.” Pending decisions by the Executive Board on these terms, project participants are invited to explain their interpretation of such terms when completing and submitting the CDM-NMB and CDM-NMM.

The proposed project activity is a special purpose company dedicated to electricity generation from renewable wood residues. The project activity is responsible for the biomass burned in the power plant, including the biomass collected from the landfill. Obviously the operation of the landfill cannot be reasonably attributed to the project activity.

The following gedanken experiment corroborate the statement.

Another experiment is to assume that as soon as the BK Itacoatiara Project operator has collected the biomass from the landfill, the owners of the landfill use the free space to dispose non combustible municipal solid waste. If the boundary of the BK Itacoatiara Project would include the geographical site

[10] Appendix B of the simplified modalities and procedures small-scale CDM project activities. Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. Type III.E. Avoidance of methane production from biomass decay through controlled combustion (Version 05: 25 February 2005).

of the landfill, emissions absolutely out of the control of the project participants would be wrongly attributed to the CDM project activity.

Despite the existence of the landfill and methane generation therein, there will always be at least a virtual landfill (or a virtual open field stockpile) in the baseline scenario. The avoidance of methane emissions is due to either to the avoidance of the creation of a new landfill (residues that will not be disposed) or for collecting and burning material that would otherwise decay in an existing landfill (residues that will not be left to decay).

This is surely why the project boundary is exactly and correctly defined in the methodology **only** as the physical, geographical site where the treatment of biomass takes place.

B.5. Details of the baseline and its development

B.5.1. Specify the baseline for the proposed project activity using a methodology specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities

The load factor of the power plant, with $9MW_{elt}$, is greater than 200kW. According to Appendix B of the simplified modalities and procedures for small-scale CDM project activities "*For a system where all fossil fuel fired generating units use fuel oil or diesel fuel, the baseline is the annual kWh generated by the renewable unit times an emission coefficient for a modern diesel generating unit of the relevant capacity operating at optimal load as given in Table I.D.1*". Thus, the baseline to be used in the project is 0.8 tCO_2/MWh.

The BK Itacoatiara project also includes a methane avoidance component that will use baseline Type III.E, as defined in Appendix B of the simplified modalities and procedures for small-scale CDM project activities (see section E.1.1 for a detailed description).

B.5.2. Date of completing the final draft of this baseline section *(DD/MM/YYYY)*

23/02/2005

B.5.3. Name of person/entity determining the baseline

Mr. A. Ricardo J. Esparta, director of Ecoinvest (contact details listed in annex I).

SECTION C. Duration of the project activity / Crediting period

C.1. Duration of the project activity

C.1.1. Starting date of the project activity

Operational since November 2002

C.1.2. Expected operational lifetime of the project activity

25y-0m

C.2. Choice of the crediting period and related information

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period

01/11/2002

C.2.1.2. Length of the first crediting period

7y-0m

C.2.2. Fixed crediting period

C.2.2.1. Starting date

Not applicable.

C.2.2.2. Length

Not applicable.

SECTION D. Monitoring methodology and plan

D.1. Name and reference of approved methodology applied to the project activity

According to Appendix B of the simplified modalities and procedures for small-scale CDM project activities for Type I.D, "*Monitoring shall consist of metering the electricity generated by the renewable technology. In the case of co-fired plants, the amount of biomass input and its energy content shall be monitored.*"

Thus, the monitoring plan of the electricity generation component consists in metering the renewable electricity generated by the power plant.

In addition, the project also includes the methane avoidance component. In accordance with Appendix B of the simplified modalities and procedures for small-scale CDM project activities for Type III.E the amount of biomass combusted by the project activity in a year will be monitored. The project owners are aware that the different origins of biomass burned in the power plant lead should be differentiated as not everything would decay in anaerobic conditions and therefore would not generate methane as forecasted in the methodology. There is no guidance in the methodology on how to handle such differences. Although it is not demanded in the methodology, project owners will maintain the monitoring of the different sources of biomass. For the methane avoidance component the biomass collected from clearing roads will not be accounted. For the biomass collected from existing open air stockpiles it is clear that part of the biomass might already been decayed. In the spirit of simplified methodologies for small-scale project activities, the biomass from open field stockpiles will be here considered. Nevertheless guidance for similar operation in future project activities submissions should be defined.

D.2. Justification of the choice of the methodology and why it is applicable to the project activity

The Monitoring Plan has been chosen as it is suggested in the Simplified Baseline and Monitoring Methodology for small-scale projects.

D.3. Data to be monitored

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D.3-1	*Electricity Quantity*	*Electricity Supplied to the grid*	*MWh*	*M*	*15 minutes measurement and Monthly Recording*	*100%*	*Electronic*	*During the credit period and two years after*	*Electricity supplied by the project to the grid Energy metering connected to the grid and Receipt of sales.*
D.3-2	*Fresh fuel quantity*	*Amount of wood chips consumed at the project activity, collected from the sawmill operation*	*Mass*	*M*	*daily*	*100%*	*Electronic and paper*	*During the credit period and two years after*	*Sustainably sourced wood waste from Mil Madeireira Itacoatiara Ltda. Operations*
D.3-3	*Old fuel quantity*	*Amount of wood chips consumed at the project activity, collected in open field stockpiles*	*Mass*	*M*	*daily*	*100%*	*Electronic and paper*	*During the credit period and two years after*	*Sustainably sourced wood waste from Mil Madeireira Itacoatiara Ltda. Operations*
D.3-4	*Clearing roads fuel quantity*	*Amount of wood chips consumed at the project activity, collected from clearing the roads*	*Mass*	*M*	*daily*	*100%*	*Electronic and paper*	*During the credit period and two years after*	*Sustainably sourced wood waste from Mil Madeireira Itacoatiara Ltda. Operations*

Credit owner and project operator, the special purpose company BK Itacoatiara (listed under A.3. Project participants), is author and the responsible for all activities related to the project management, registration, monitoring, measurement and reporting.

In accordance with the approved methodology the PDD lists two data to be monitored:

Electricity quantity

The project owner measures with an electronic supervisory system the amount of total electricity generation, electricity exported to the grid, and electricity consumed by the project.

There is a meter that informs the supervisory system (Figure 11), this meter is periodically calibrated. The system keeps historical data that can be accessed when necessary.

Double check is done with the receipt of sales issued by CEAM, the local electricity utility, in the case of exported electricity.

Therefore, BK Itacoatiara is the main responsible for generating, monitoring, measuring and reporting data regarding electricity exportation to the grid.

Fuel quantity

The project owner monitors wood residues that are burned to generate electricity. The measurement is made at two stationary points: The first one is the total of biomass fed into the boiler. This data is obtained through a load cell that sends the information to the supervisory system. This historical data also can be obtained accessing the system. The second is a scale used to quantify wood residues entering the site. This measurement is made manually in the field using a periodically calibrated a mechanical scale. Every day this information is electronically stored into an spreadsheet.

All monitored data are measured twice with different equipments (meters or scales). If any small divergence is found, both equipments are re-calibrated. The numbers that lead to the smallest electricity generation and methane avoidance will be used if the uncertainty is not considered significant (less than 1% difference). The electricity generation and methane avoidance will not be accounted for GHG emission reductions if the uncertainty is considered significant.

D.4. Name of person/entity determining the monitoring methodology

Mr. A. Ricardo J. Esparta, director of Ecoinvest (contact details listed in annex I).

SECTION E. Calculation of GHG emission reductions by sources

E.1. Formulae used

E.1.1 Selected formulae as provided in appendix B

The emission reduction of the electricity generation is simply the annual electricity supplied to the grid (EG_y, *in MWh*) times the standard emission factor for diesel generator systems bigger than 200 kW, i.e., 0.8 tCO_2/MWh.

For the methane avoidance component of the project the formulae listed in Type III.E are used as follows:

CH4_IPCCdecay = (MCF * DOC * DOCF * F * 16/12)

Where:

- CH_4_$IPCC_{decay}$ IPCC CH_4 emission factor for decaying biomass in the region of the project activity (tonnes of CH_4/tonne of biomass or organic waste)
- MCF methane correction factor (fraction) (default is 0.4)
- DOC degradable organic carbon (fraction, see equation below or default is 0.3)
- DOC_F fraction DOC dissimilated to landfill gas (default is 0.77)
- F fraction of CH_4 in landfill gas (default is 0.5)

For DOC, the following equation may be used instead of the default:

DOC = 0.4 (A) + 0.17 (B) + 0.15 (C) + 0.30 (D)

Where:

- A per cent waste that is paper and textiles
- B per cent waste that is garden waste, park waste or other non-food organic putrescibles
- C per cent waste that is food waste
- D per cent waste that is wood or straw

$$BE_y = Q_{biomass} * CH_4\_IPCC_{decay} * GWP\_CH_4$$

Where:

- BE_y Baseline methane emissions from biomass decay (tonnes of CO2 equivalent)
- $Q_{biomass}$ Quantity of biomass treated under the project activity (tonnes)
- GWP_CH_4 GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4)

E.1.2 Description of formulae when not provided in appendix B

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary

No formula is needed. Emissions by sources are nil.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

No formula is needed. No leakage calculation is required.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the project activity emissions

Project emissions for the electricity generation = Zero (0 tCO2)

Project emissions from the methane avoidance component = 7,987 tCO2e annually (see example calculation in item A.4.2)

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

Since the electricity generation is eligible under the project activity Type I, category D of appendix B of the simplified modalities and procedures for small-scale CDM project activities, the baseline is calculated by multiplying the net annual kWh generated by the renewable unit (own consumption subtracted) times the default emission coefficient of 0.8 t CO2/MWh for a diesel generating units with a load factor greater than 200 kW, as given in Table I.D.1 of this appendix.

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period

The emission reductions due the project activity are the baseline emissions minus the emissions from the methane emissions avoidance.

$$ER_y = BE_y + EG_y \times 0.8 - PE_y$$

E.2 Tables providing values obtained when applying formulae above

Table 2 – Emissions Reductions, component 1, power generation

Installed power (MW)	9			
Baseline (tCO2/MWh)	0,8			
	Generated energy (MWh)	**tCO2 abated**	**Total tCO2 abated (acummulated)**	
Total 2002	6,684	5,347	5,347	1st year
Total 2003	53,069	42,455	47,802	2nd year
Total 2004	57,166	45,733	93,535	3rd
Total 2005*	55,117	44,094	137,629	4th
Total 2006	55,117	44,094	181,722	5th
Total 2007	55,117	44,094	225,816	6th
Total 2008	**55,117**	**44,094**	**269,910**	**7th year**
Total 2009	55,117	44,094	314,003	8th
Total 2010	55,117	44,094	358,097	9th
Total 2011	55,117	44,094	402,190	10th
Total 2012	55,117	44,094	446,284	11th

*From 2005 onwards generation assumed equal to the average of 2003 and 2004

Table 3 – Emissions Reductions from methane emissions avoidance

Emission Reductions - Methane Avoidance	Years 2002	2003	2004	From 2005 to 2015 per year*	Total 1st Crediting Period from November 2002 to October 2009
CH4_IPCCdecay (tCH4/t biomass)	0.06	0.06	0.06	0.06	0.06
Clearing road (t accounted for methane avoidance)	0	6,171	23,831	3,870	48,707
Sawmill (t accounted for methane avoidance)	12,090	72,835	56,847	93,173	592,105
Landfill (t accounted for methane avoidance)	1,384	27,578	24,592	12,957	116,179
Quantity of biomass accounted for methane avoidance/year (Qbiomass in t)	13,474	100,413	81,439	106,630	710,701
Baseline Emissions (BEy, in tCO2eq)	17,430	129,894	105,349	137,290	916,237
Energy content of biomass (Ebiomass in TJ/t)	0.00963	0.00963	0.00963	0.00963	n/a
Project emission (PE, in tCO2)	978	7,739	7,644	7,987	54,965
Emission Reductions from Methane Avoidance (tCO2)	**16,452**	**122,155**	**97,705**	**129,303**	**861,272**

*Expected

Table 4 – BK Itacoatiara Emission Reductions

Total Emission Reduction	Years 2002	2003	2004	From 2005 to 2015 per year*	Total 1st Crediting Period from November 2002 to October 2009
Eletricity Generation (tCO2eq)	5,347	42,455	45,733	44,094	306,655
Methane Avoidance (tCO2eq)	16,452	122,155	97,705	129,303	861,272
Total Itacoatiara Emission Reductions (tCO2)	**21,799**	**164,610**	**143,439**	**173,397**	**1,167,926**

*Expected

SECTION F. Environmental impacts

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity

The proponent of any project that involves the construction, installation, expansion, and operation of any polluting or potentially polluting activity or any activity capable of causing environmental degradation is required to secure a series of permits from the respective state environmental agency. In addition, any such activity requires the preparation of an environmental assessment report, prior to obtaining construction and operation permits. Such a report containing an investigation of the following aspects was prepared:

- Impacts to climate and air quality.
- Geological and soil impacts.
- Hydrological impacts (surface and groundwater).
- Impacts to the flora and animal life.
- Socio-economical (necessary infra-structure, legal and institutional, etc.).

BK Energia Itacoatiara Ltda. has the authorization issued by ANEEL[11] to operate as an independent power producer (resolution number 425, 15/Oct./2001).

The project has the necessary environmental and construction licenses.

The Operation License (LO number 355/02-01) was issued in November 7, 2003, by the environmental institute from the state of Amazonas (IPAAM – *Instituto de Proteção Ambiental do Amazonas*, Figure 12).

The sawdust and the wood chips residues were a problem to Mil Madeireira and to the city of Itacoatiara. In 1997 IPAAM told Mil Madeireira Itacoatiara Ltda. to stop burning the residues. Since then, the company had started to store the residues in the stockpiles. This resulted in the accumulation of about 110,000 tonnes of wood waste and the emission of methane. The implementation of the biomass power plant, in 2002, solves two problems for the city. One, switching the diesel generation and other, eliminating the huge stockpiles left to decay.

The main environmental impacts identified were particulate matter emissions and wastewater management.

A multi-cyclone was installed to reduce particulate matter emissions and these emissions are periodically monitored and compared with legal standards.

A wastewater treatment was built to mitigate wastewater impacts and these impacts are also monitored and compared with legal standards.

[11] ANEEL – Agência Nacional de Energia Elétrica (Electricity Regulatory Agency)

Levels of emissions are permanently monitored and compared with legal standards.

SECTION G. Stakeholders' comments

G.1. Brief description of the process by which comments by local stakeholders have been invited and compiled

Following the law established by IPAAM, BK Itacoatiara has published a call in a local newspaper informing that it had obtained the Construction License (LI, from the Portuguese *Licença de Instalação*). The public call was published on Local Newspaper, *Diário do Amazonas* on 10/12/2004 (Figure 13).

Besides the stakeholders comment request required to obtain the environmental licenses, the Brazilian Designated National Authority for the CDM ("*Comissão Interministerial de Mudanças Globais de Clima*"), under other requirements, demands the translation of the PDD into Portuguese, the compulsory invitation of selected local stakeholders, the validation report issued by an authorized DOE (CIMGC resolution number 1, September 11, 2003), under other requirements, in order to provide the letter of approval.

The proponent of the project will send these letters to the stakeholders in order to invite their comments while the PDD of the project is open for comments in the validation stage in the United Nations Framework Convention on Climate Change.

G.2. Summary of the comments received

Brazilian DNA for the CDM requests project activities to be open for comments prior to validation. Thus, in addition to UNFCCC global stakeholders' comments process this project will be open for inputs from local stakeholders at the same time. Any comments will be disclosed after validation.

G.3. Report on how due account was taken of any comments received

Brazilian DNA for the CDM requests project activities to be open for comments prior to validation. Thus, in addition to UNFCCC global stakeholders' comments process this project will be open for inputs from local stakeholders at the same time. Any comments will be disclosed after validation.

SECTION H. Annexes

H.1. Annex 1 - Contact information on participants in the project activity

Organization:	Comissão Interministerial de Mudança Global do Clima (Brazilian Designated National Authority of the CDM)
Street/P.O. Box:	Esplanada dos Ministérios, Bloco E, sala 240
City:	Brasília
State/Region:	Distrito Federal
Postfix/ZIP:	70067-900
Country:	Brazil
Telephone:	+55 (61) 317-7523
FAX:	+55 (61) 317-7557
E-Mail:	
URL:	http://www.mct.gov.br/clima/ingles/Default.htm
Represented by:	
Title:	Executive Secretary
Salutation:	Mr.
Last name:	Miguez
Middle name:	Domingos Gonzalez
First name:	José
Department:	Ministry of Science and Technology
Personal e-mail:	miguez@mct.gov.br

Organization:	BK Energia Itacoatira Ltda.
Street/P.O. Box:	Rodovia Torquato Tapajós, km 227 / Caixa Postal 39
City:	Itacoatiara
State/Region:	Amazonas
Postfix/ZIP:	69100-000
Country:	Brazil
Telephone:	+55 (92) 521-3323/-3333

FAX:	+55 (92) 521-3326
E-Mail:	
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last name:	Scop
Middle name:	
First name:	Renato
Department:	
Personal e-mail:	scop@pwamazon.com.br

Organization:	Ecoinvest
Street/P.O. Box:	Rua Padre João Manoel, 222
City:	São Paulo
State/Region:	São Paulo
Postfix/ZIP:	01411-000
Country:	Brazil
Telephone:	+55 (11) 3063-9068
FAX:	+55 (11) 3063-9069
E-Mail:	info@ecoinv.com
URL:	http://www.ecoinv.com/
Represented by	
Title:	Director
Salutation:	Mr.
Last name:	Esparta
First name:	A. Ricardo J.
Mobile:	+55 (11) 8381-8869
Personal e-mail:	esparta@ecoinv.com

H.2. Annex 2 - Information regarding public funding

No public funding was and will be used in the present project.

H.5. Annex 5 - Figures

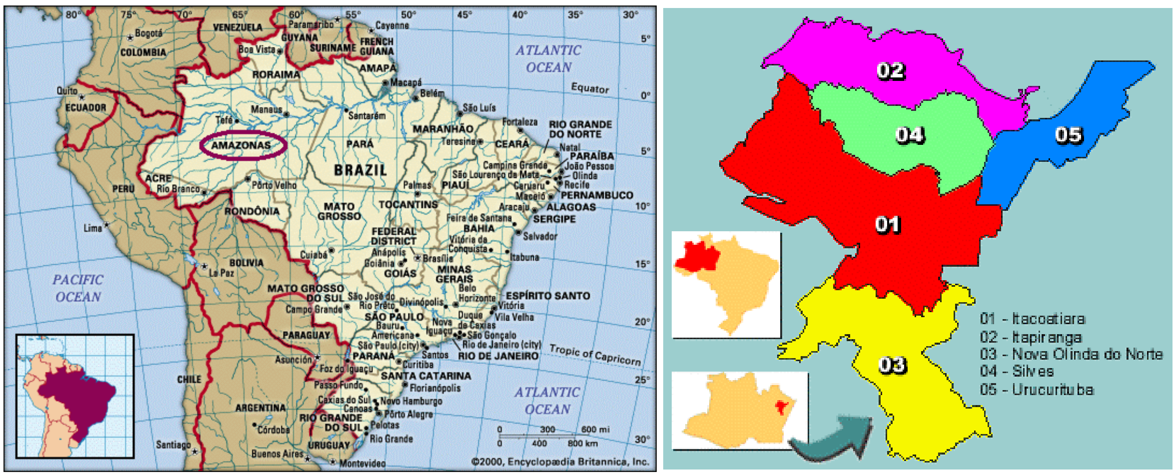

Figure 1 - Political division of Brazil showing the Amazonas State and the city of Itacoatiara (Sources: Encyclopaedia Britannica, 2003 and City Brazil, 2005)

April 9 , 2001

Piratini, CGDE, Koblitz Energia S.A.
Att: Dr. Ricardo Esparta
Ecoinvest Assessoria Ltda

Dear Sir,

Thank you for sending the document "Notes on project conception" viewing "Electrical Energy Generation from Biomass and CO_2 emission reductions". Regarding the documents that were forwarded to us, we should inform you that:

1 - As you know, the Brazilian Government established the Interministerial Commission on Global Climate Change by means of a presidential decree of July 7, 1999, with the purpose of articulating governmental actions in this area. Among other attributions, the Commission is responsible for approving projects that result in emission reductions and that are considered eligible to the Clean Development Mechanism, once this mechanism is implemented.

2 - Regarding the project proposals, the Government of Brazil has no objection to the further development of these projects and reserves the right to approve them when eligibility criteria for CDM projects are decided by the Conference of the Parties to the Convention on Climate Change.

3 - Thus, any analysis by this Commission of projects viewing to conform with the provisions of the mechanisms proposed under the Kyoto Protocol will necessarily be in accordance with the decisions adopted by the United Nations Framework Convention on Climate Change, which we expect to take place soon, as from the resumed session of the 6th Conference of the Parties to the Convention, to be held next July in Bonn, Germany.

4 - I would like to recall, however, that the Brazilian government does not oppose the application of Ecoinvest to the financial resources of the World Bank Prototype Carbon Fund (PCF), since the projects meet well-defined social, environmental, and economic interests of regional and national importance.

5 - Therefore, only the World Bank and the PCF are entitled to analyze and decide on the acceptance of these projects.

Cordially,

Ronaldo Mota Sardenberg
State Minister of Science and Technology
President of the Interministerial Commission on Global Climate Change

Figure 2 – Koblitz-Piratini CDM non-objection letter

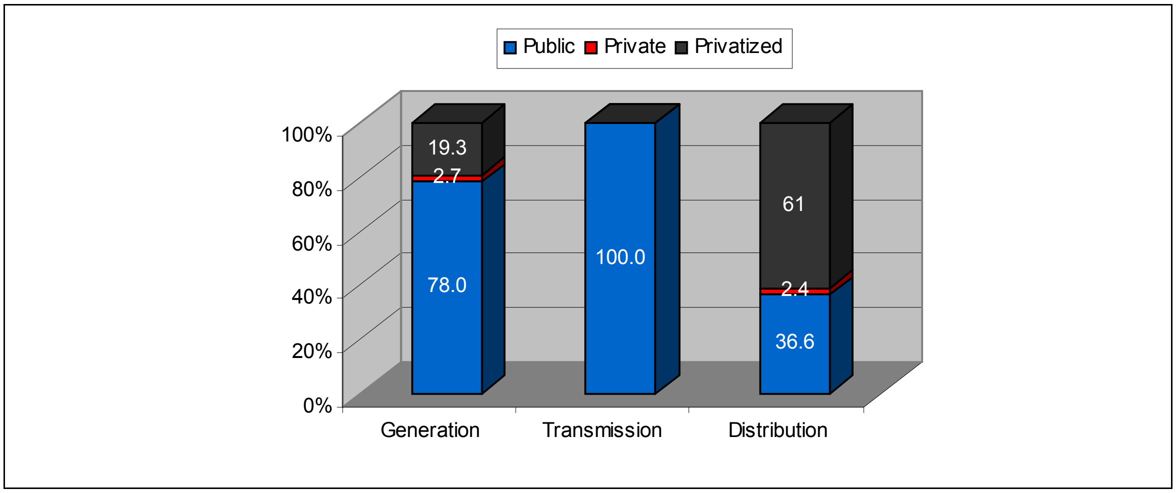

Figure 3 - Participation of private capital in the Brazilian electricity market in December 2000 (Source: BNDES, 2000).

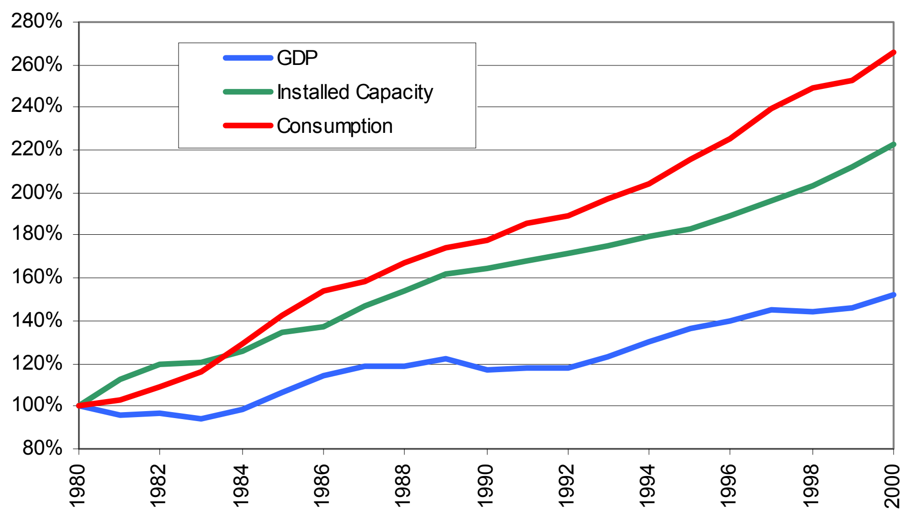

Figure 4 - Cumulated variation of GDP, electricity supply (installed capacity) and demand (consumption) (Source: Eletrobrás, *http://www.eletrobras.gov.br*; IBGE, *http://www.ibge.gov.br/*).

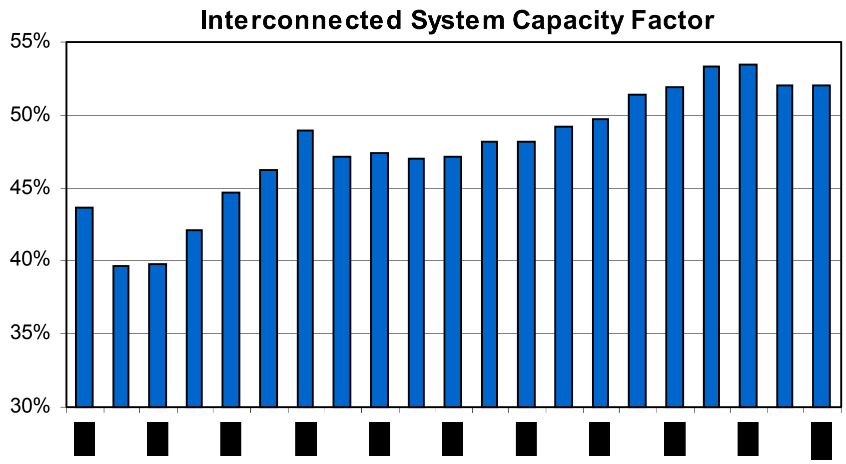

Figure 5 - Evolution of the rate of generated energy to installed capacity (Source: Eletrobrás, http://www.eletrobras.gov.br/).

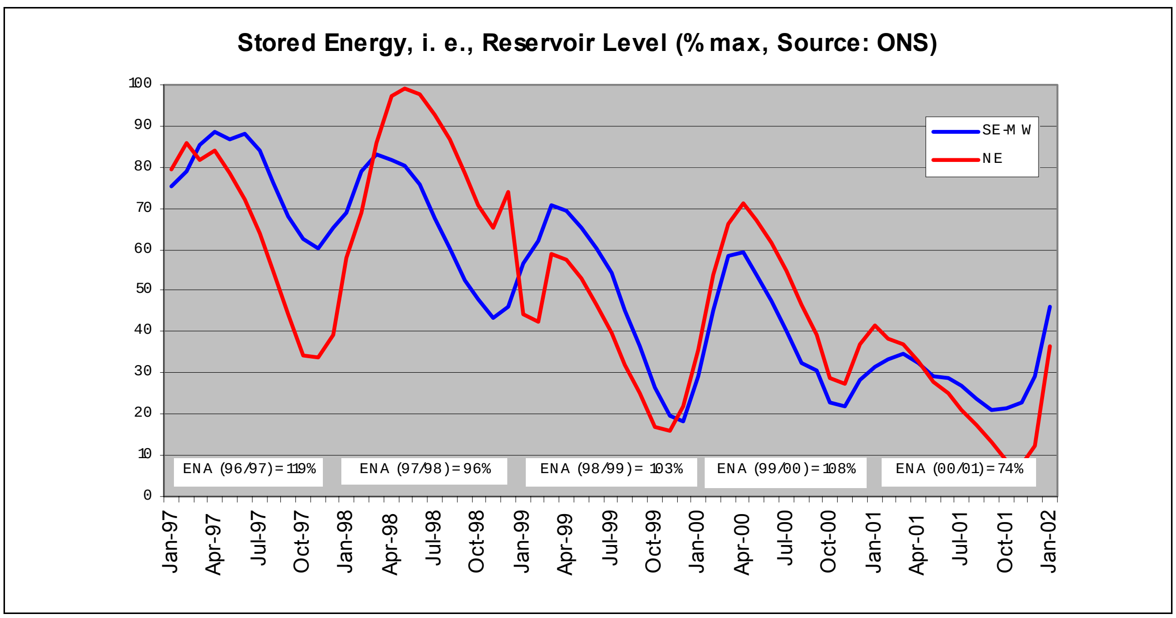

Figure 6 - Evolution of the water stored capacity for the Southeast/Midwest (SE-MW) and Northeast (NE) interconnected subsystems and intensity of precipitation in the rainy season (ENA) in the southeast region compared to the historic average (Source: ONS, http://www.ons.org.br/)

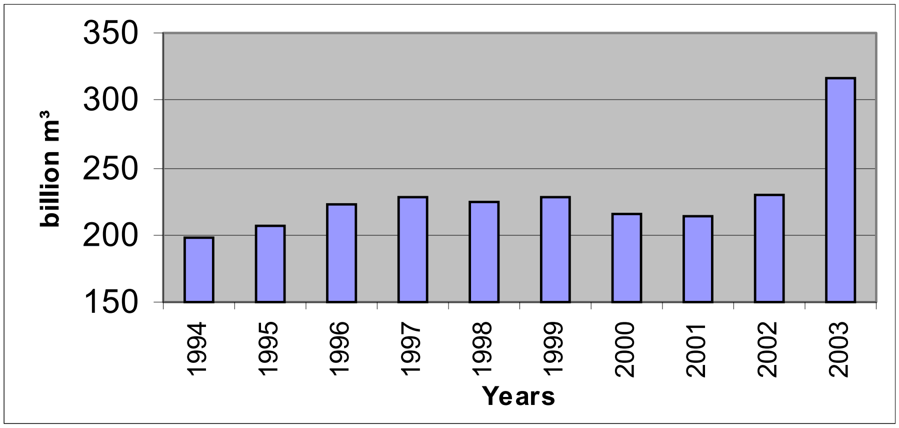

Figure 7 – Evolution of the Brazilian natural gas proved reserves (Source: Petrobras, http://www.petrobras.com.br/)

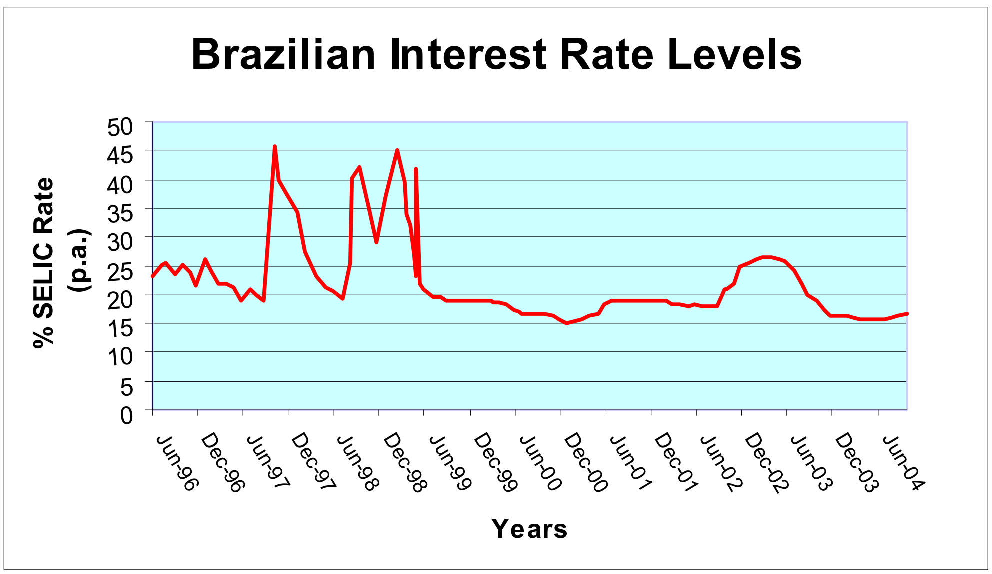

Figure 8 - SELIC rate (Source: Banco Central do Brasil, http://www.bcb.gov.br/ **)**

Financial Sensitivity Analysis - BK Itacoatiara

SELIC rate* (1996 - 2004)	%	Project NPV	Project NPV with CER
Maximum Level	45,00%	(R$ 7.355.046)	(R$ 3.267.187)
Average	22,36%	(R$ 4.468.590)	R$ 5.113.943
Minimum Level	15,25%	(R$ 1.278.141)	R$ 13.018.753
Current Discount Rate	**17,00%**	**(R$ 2.290.567)**	**R$ 10.547.038**
Project IRR		**13,43%**	**31,66%**

* The SELIC rate was created in 1996.

Figure 9 - Financial Sensitivity analysis

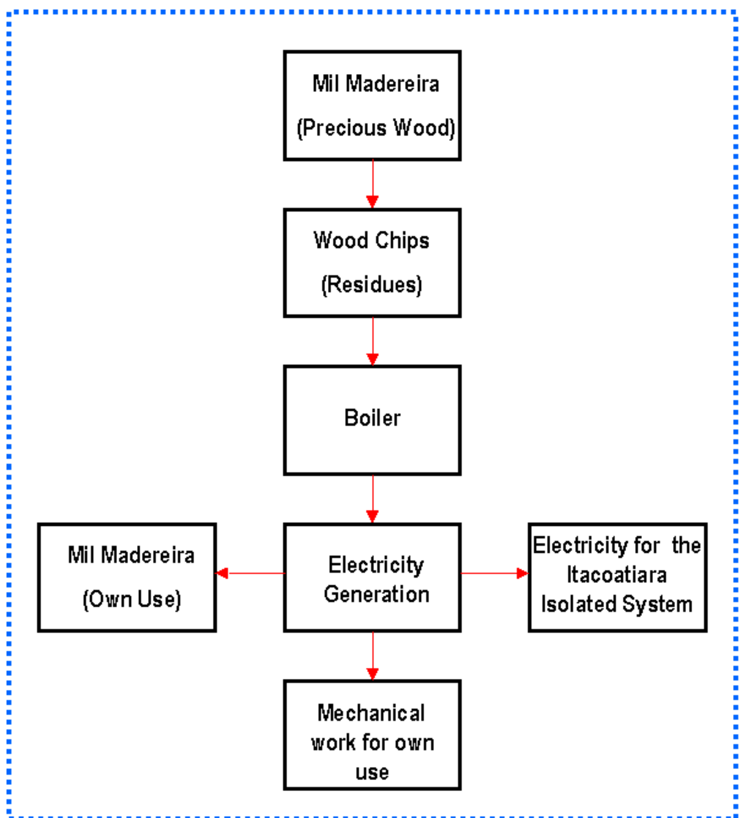

Figure 10 - Project Boundary

Figure 11 - Software for energy control.

IPAAM
Instituto de Proteção Ambiental do Amazonas

AMAZONAS

LICENÇA DE OPERAÇÃO – L.O. Nº 355/02-01

O INSTITUTO DE PROTEÇÃO AMBIENTAL DO AMAZONAS – IPAAM, no uso das atribuições que lhe conferem a Lei nº 1532 de 06 de julho de 1992, o Decreto n.º 10.028 de 04 de fevereiro de 1987, a Lei nº 2.367 de 14 de dezembro de 1995 e o Decreto nº 17.033 de 11 de março de 1996, expede a presente Licença que autoriza a:

INTERESSADO: BK Energia Itacoatiara Ltda.

ENDEREÇO: Rodovia Torquato Tapajós, km 227,2, Zona Rural, Itacoatiara - AM

CNPJ/CPF: 04.310.086/0001-00

INSCRIÇÃO ESTADUAL: 04.147.898-9

FONE: (092) 232-4229

FAX: (092) 521-2644/2639/2603/2610

REGISTRO NO IPAAM: 1008.2401

PROCESSO Nº: 1205/T/01

ATIVIDADE: Geração de Energia Elétrica

LOCALIZAÇÃO: Rodovia Torquato Tapajós, km 227,2, Zona Rural, Itacoatiara - AM

FINALIDADE: Autorizar o funcionamento de uma central termoelétrica geradora de energia elétrica e vapor, com capacidade de 9 MW.

POTENCIAL POLUIDOR/DEGRADADOR: Alto

PORTE: Pequeno

Esta Licença é válida por um prazo de 365 dias corridos, observadas as restrições e/ou condições constantes no verso desta e anexos que, embora não transcritos, são partes integrantes da mesma.

Manaus - AM, 07 NOV 2003

Diretor Técnico

José Lúcio do Nascimento Rabelo
Presidente do IPAAM

Figure 12 – BK Itacoatiara operation license

DE : BKENERGIA FAX : 0925212603 23 FEV. 2005 12:16 Pág.1

DIÁRIO DO AMAZONAS Data: 11/10/2002

ERRATA

A Empresa Aldeir da S. Campos , CNPJ nº 00.517.404 / 0001-34, Insc. Mun. nº 7019301, situada a Rua F, nº 13 – Aleixo, Cep. 69060-000- Manaus / Am.
No Edital Publicado no dia 01/07/2004, no Jornal Diário do Amazonas onde lê-se notas extraviadas de n.º 0001 a 00500. Leia – se 0001 a 0032, 0034 a 0044, 0046 a 0500, ficando as mesmas sem feitos legais para quem tiver da posse.

IPAAM
Instituto de Proteção Ambiental do Amazonas

AMAZONAS

COMUNICADO

BK Energia Itacoatiara Ltda., torna público que recebeu do IPAAM, a **Licença de Operação n.º 355/02-02**, que autoriza o funcionamento de uma central termoelétrica com resíduos industriais de madeira, com capacidade de 9 MW, com validade de 365 dias, para Geração de Energia Elétrica, no Município de Itacoatiara – AM.

REPÚBLICA FEDERATIVA DO BRASIL
ESTADO DO AMAZONAS
CARTÓRIO DO 4º OFÍCIO DE REGISTRO CIVIL
MIRANDOLINA DA SILVA GODINHO MACEDO

EDITAL DE PROCLAMAS

PODER JUDICIÁRIO DO ESTADO DO AMAZONAS
FORUM DE JUSTIÇA MINISTRO HENOCH REIS
JUÍZO DE DIREITO DA 19ª VARA
DE ACIDENTES DO TRABALHO

EDITAL DE CITAÇÃO COM PRAZO DE 20 DIAS

MÍSTICOS

4 EDITAIS & COMUNICADOS

AVISOS

INFORMAÇÕES 9171.6741 644-9048

Figure 13 - Published call for stakeholders' comments

H.6. Annex 6 - Tables

Table 5 – Sources and amounts of wood residues

	2002	2003	2004	2005	TOTAL	%
Wood residues (ton)	**13,473**	**106,584**	**105,269**	**49,962**	**275,289**	**100%**
Sawmill	12,090	72,835	56,847	42,319	**184,091**	67%
Clearing roads	0	6,171	23,831	1,758	**31,760**	12%
Landfill/stockpiles	1,384	27,578	24,592	5,885	**59,439**	22%

H.7. Annex 7 - Bibliography

Arida, P. E. L. Bacha, and A. L. Resende (2005). *Credit, Interest, and Jurisdictional Uncertainty: Conjectures on the Case of Brazil."* In F. Giavazzi, I. Goldfajn e S. Herrera (orgs.), Inflation Targeting, Debt, and the Brazilian Experience, 1999 to 2003. Cambridge, MA: MIT Press.

BNDES (2000). O setor elétrico – Desempenho 1993/1999. Banco Nacional de Desenvolvimento Econômico e Social. Informe Infra-estrutura, n^{o} 53. http://www.bndes.gov.br/

CGE/CBEE (2002). Programa de Energia Emergencial. Câmara de Gestão da Crise de Energia Elétrica – Comercializadora Brasileira de Energia Emergencial.

City Brazil (2005). *City Brazil – Percorrendo o Brazil de A a Z.* (Retrieved June 6, 2005 from http://www.citybrazil.com.br/).

Eletrobrás (2004). *Plano de Operação para 2004. Sistemas Isolados.* GTON – Grupo Técnico operacional da Região Norte. Centrais Elétricas Brasileiras S.A.

Encyclopædia Britannica (2003). *Ultimate Reference Suite CD-ROM*. Copyright © 1994-2002 Encyclopædia Britannica, Inc.

IBGE (2004). Banco de dados Cidades@,. Instituto Brasileiro de Geografia e Estatística (http://www.ibge.gov.br/).

OECD (2001). OECD Economic Surveys: Brazil. Organization for Economic Co-Operation and Development, Paris, France.

OECD (2005). OECD Economic Survey of Brazil 2005: Regulation of the electricity sector. Organization for Economic Co-Operation and Development, Paris, France

Schaeffer, R., J. Logan, A. S. Szklo, W. Chandler and J. C. de Souza (2000). *Electric Power Options in Brazil.* Pew Center on Global Climate Change.