Emission Reduction Credit Creation Requirements

Piratini, CGDE, Koblitz Energia S.A.

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Prepared by

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Table of Contents

1. Introduction

"*Piratini, CGDE, Koblitz Energia S/A*" is a special purpose company (SPC) set up to use residues from wood processing companies around the city of Piratini, in the south of Rio Grande do Sul State, south of Brazil, to generate electricity in power plant configurations using a high pressure boiler (43 bar) and a multiple stage condensing steam turbine (output pressure 83 mbar) coupled with a 10 MW generator. For the expected electric energy output (around 73,000 MWh yearly, assuming a 90% capacity factor minus 5,000 MWh from its own consumption) a Power Purchase Agreement (PPA) was signed with the local power utility (CEEE).

2. Proponent Identification

2.1 Supplier data

Company:
Piratini, CGDE, Koblitz Energia S/A
Address:
Estrada Cancelao, km 20 – 4º Subdistrito
Zip code + city address:
96490-000 Piratini, RS
Postal address:
Av. Brig. Luiz Antonio, 2504 - Conj. 171
Zip code + city postal address:
01402-000 Sao Paulo, SP
Country:
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2.2 Corresponder's data

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Country:
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Contact person:
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cmm@ecoinv.com

2.3 Design of the Investment

"*Piratini, CGDE, Koblitz Energia S/A,*" *Usina Piratini*, is a Special Purpose Company (SPC) owned by the following shareholders: Companhia Geral de Distribuicao Eletrica (C.G.D.e.), 80%, Koblitz Energia Ltda., 10%, a Brazilian EPC company (CEEE), 10%, and the State of Rio Grande do Sul power utility. Usina Piratini's sole activity is to generate electricity using wood residues from sawmills. Usina Piratini has been financed on a project basis whereby the company's assets including long- term energy contracts have been posted as collateral for the loan. The shareholders have invested roughly 25% of the total project cost and the balance has been financed with a loan by the Brazilian Development Bank (BNDES, "*Banco Brasileiro de Desenvolvimento Economico e Social"*).

3. Emission Reduction Project

3.1 Pre-Project Conditions

In the mid-south region of the State of Rio Grande do Sul the wood processing industry is one of its main economic activities. Under the regulatory framework, private companies were not allowed until the middle of the 1990's to work as independent power producers as there was no economic incentives to use agricultural residues as a source of energy. Under that situation it was more common to use electricity from the grid or to use diesel generators. Therefore all the agricultural residues were simply dumped into large piles for later open-air incineration.

3.2 Emission Reduction Strategy

This single project solved two of these problems at once, the environmental issue of the final disposal of agricultural residues, and an energy deficit problem by supplying a reliable new source of electricity. This was accomplished by using the agricultural residues from reforested areas as a renewable energy source to produce electricity, avoiding the use or diesel generators and the expansion of the use of fossil fuels in power generation.

3.3 Post-Project Conditions

Features such as the great territorial extension and the enormous hydro potential were influential in the formation of the current electricity generation industry in Brazil, which had been predominantly hydro-based (Figure 1).

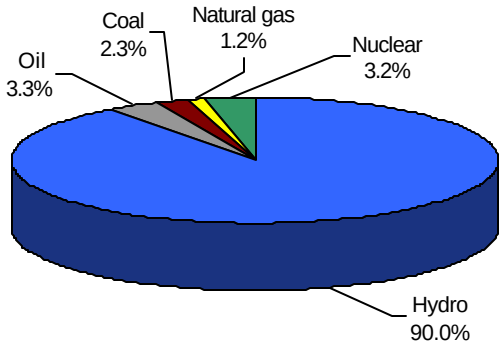

Figure 1 – Share of the primary sources for electricity generation in Brazil in August 2001 (Source: Eletrobrás, 2002).

The Piratini power plant started operation in January 2002, under the rationing imposed to the country due to under average rainfall in the previous years.

Under the current situation there is still no long-term solutions for the problems that were caused by the shortage and rationing in 2001. However, the Brazilian government has acknowledged that it is strategically important for the country to increase thermoelectric generation and consequently be less dependent on hydro power. With that in mind the federal government launched in 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), which originally planned the construction of 47 thermoelectric plants using natural gas imported from Bolivia, totaling 17,500 MW more capacity before December 2003. During 2001 and the beginning of 2002 the plan was rearranged to 40 plants and 13,637 MW, to be installed before December 2004 (Federal Law 10,438 of April 26th, 2002, Article 29). The current status of the plants included in the plan can be seen in Figure 2.

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 before the end of 2002 (using mainly diesel oil, 76,9 %, and residual fuel oil, 21.1 %), totaling 2150 MW power capacity (figure 3).

Focusing the investigation in the state of Rio Grande do Sul, the planned (with licensing process at ANEEL) and already in operation thermoelectric plants are listed in Annex B. It can be calculated according to the numbers the thermoelectric matrix displays that the state of Rio Grande do Sul has the following share:

- Coal – 52.3%
- Natural gas – 44.0%
- Process (industrial) gas – 2.6%
- Residual fuel oil – 0.8%
- Biomass - 0.32%

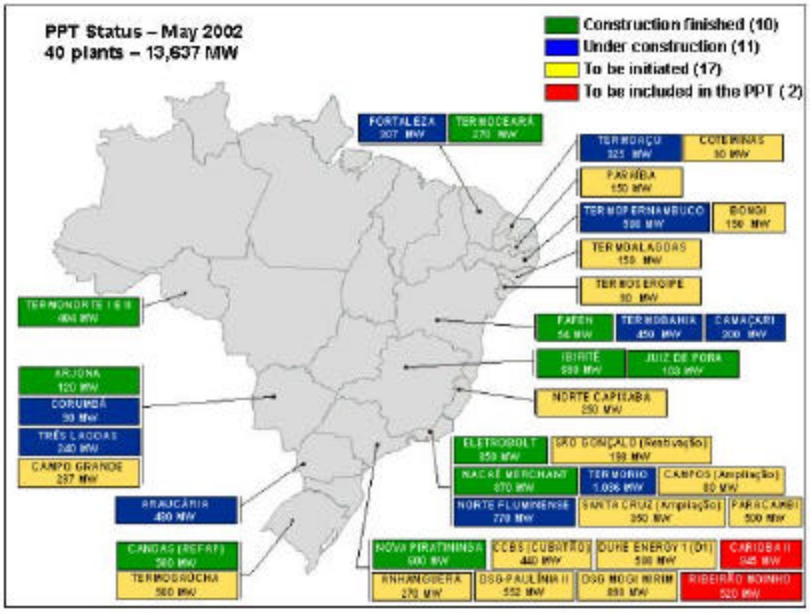

Figure 2 - Thermoelectric Priority Plan Plant's Status in May 2002 (Source: ONS)

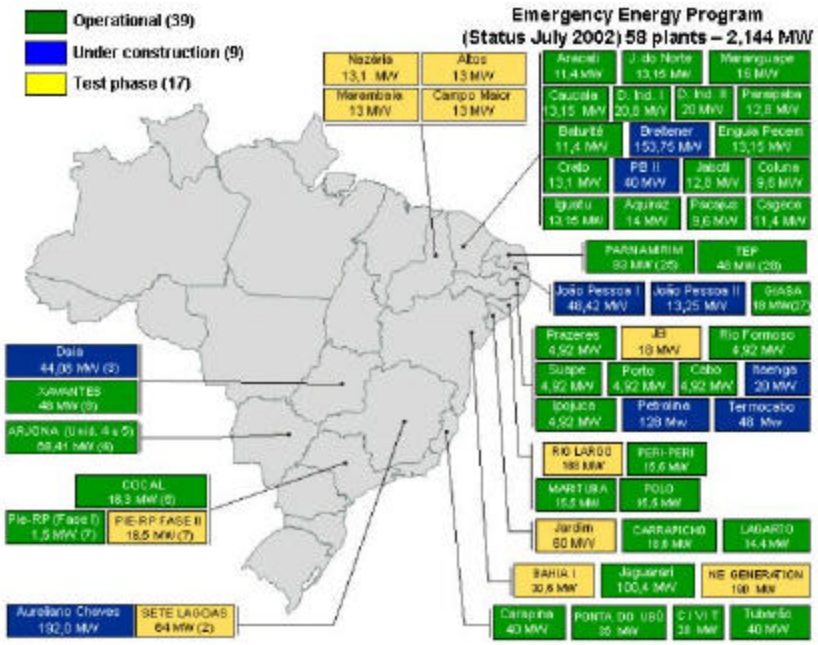

Figure 3 – Emergency Energy Plan Plant's Status in July 2002 (Source: ONS)

It is unequivocal that hydroelectricity is and will continue to be responsible for the electricity base load in Brazil. The hydro resources in the South and Southeast of the country are largely exploited, and most of the remaining reserves are located in the Amazon basin, far from the industrial and population centers[1]. Clearly, new additions to Brazil's electric power sector are shifting rapidly from hydroelectricity to natural gas plants, what can be forecasted to the beginning of 2000[2].

From this information it is clear how complex the determination of an unambiguous greenhouse gas emission baseline for electricity generation for later delivery to the grid will be. Nevertheless one trend is observed, namely the change of priorities for electricity generation towards thermoelectric generation, mainly through the use of less fossil fuels. Under the current trend the Piratini power plant is clearly shifting power production towards a renewable energy source and away from the "business as usual" trend of a more intensive use of fossil fuels.

4. Mandatory Criteria for Emission Reduction Credits

4.1 Real

[1] OECD (2001). *OECD Economic Surveys: Brazil*, Organization for Economic Co-Operation and Development, Paris-France, June 2001.
[2] 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, May 2000.

Without this project thermoelectric power production expansion would be strongly dependent on fossil fuels, mainly from coal and natural gas from the grid and diesel in isolated areas. This project substituted fossil fuel power generation.

4.2 Surplus

Additional to the much-needed local power generation, which will increase the reliability of electricity supply, this project will solve the problem of agricultural residues. At the operation start in January 2002, environmental and operation licenses were available.

4.3 Quantifiable

A recurring trend in power generation in Brazil, is the shift from electric generation towards thermoelectric generation and a more intensive use of fossil fuels.

Therefore it is proposed here the conservative approach of a single proxy technology baseline for electricity generation using the lowest carbon-intensity fossil fuel – i.e. around 137 kgC/MWh or 502 kgCO_2/MWh; which refers to natural gas with 99.5% fuel oxidation and 40% energy conversion efficiency (open cycle Brayton system as the majority of the new installed natural gas fired power plants in Brazil).

4.4 Unique

Emission reductions will be registered with the responsible Brazilian and Canadian authorities.

4.5 Verifiable

The Piratini power plant has a power purchase agreement with the State of Rio Grande do Sul power utility, CEEE. Two meters are controlled by the Piratini power plant and the others by CEEE which will ensure power is delivered. Emission reductions are verified towards power production and delivery to the grid, i.e. only after the invoice is issued.

5. Quantification of Emission Reductions

5.1 Data Collection

In order to deliver the desired emissions reduction, the power production of the Piratini power plant from January to April 2002 will be used. There are already invoices available for this period, displaying these results in Table 1.

Month	**Delivered to the grid (kWh)**
January/2002	680,462.20
February/2002	381,563.70
March/2002	496,474.81
April/2002	1,462,301.00
Total	**3,020,801.71**

Table 1 – Electricity delivered to the grid

5.2 Baseline Determination

Key Factors Influencing the Baseline and the Project

- 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 planned the construction of 47 thermo plants using natural gas imported from Bolivia, totaling 17,500 MW of new installed capacity before December 2003. During 2001 and the beginning of 2002 the plan was rearranged to 40 plants and 13,637 MW to be installed before December 2004 (Federal Law 10,438 of April 26th, 2002, Article 29).

- The *Emergency Energy Program* had the short-term goal of building 58 small to medium thermal power plants before the end of 2002 (using mainly diesel oil, 76,9 %, and residual fuel oil, 21.1 %), totaling 2150 MW power capacity (CGE-CBEE, 2002).

- Regulation of the electricity restructuring law number 10,438, signed in April 26th, 2002, included the following:

    - Ensure a competitive market by allowing energy from government-owned generators to be sold at market prices determined via public auctions. For federal and state-owned generators (Cemig and Copel) this is the most significant proposal, as it should ensure a sharp rise in returns on generation between 2003-6.
    - Provide incentives to increase system capacity by (1) raising distributors' contracting requirements from 85% to 95% and (2) providing incentives for contracting backup energy.

- o Establish a tariff to put all energy on a level playing field. In the long-term, change tariff methodology to make it more market-based.
- o Subsidies to limit a rise in tariffs between 2003-6 (as initial contracts roll-off) will be put in place, including a natural gas subsidy.
- o Restructure tariffs to reduce subsidies provided for industrial tariffs (paid with higher residential tariffs) and complete the split of Distribution tariffs into two pieces: (1) distribution and (2) commercialization.
- o Provide incentives for large customers to migrate from captive to free status to increase competition.
- o Implement moves to make spot market more reflective of market realities.

An unequivocal trend is the increase of fossil fuels shares, i.e. the increase of greenhouse gas (GHGs) emissions from electricity generation within Brazil. This trend can be explained with the country's strategic goal of reducing its dependence on a single source of electricity production, (i.e. hydro). In this context, the increase of investments on thermal electricity generation, mainly using natural gas, becomes understandable. Therefore it is proposed here that the conservative approach of a single proxy technology baseline for electricity generation using the lowest carbon-intensity fossil fuel – i.e. around 137 kgC/MWh (502 $kgCO_2$/MWh); which refers to natural gas with 99.5% fuel oxidation and 40% energy conversion efficiency (open cycle Brayton system as the majority of the new installed natural gas fired power plants in Brazil).

5.3 Emission Reduction Calculation

Assumed thermodynamic efficiency factors (conversion heat to electricity)

- Natural Gas = 40%
- Coal, diesel and residual fuel oil = 30%
- Oxidization (fuel burned) = 99.5%

Total Efficiency Factor

- Natural Gas = 0.995 ÷ 0.4 = 2.488
- Coal, diesel and residual fuel oil = 0.995 ÷ 0.3 = 3.317

Fuel	tC/TJ	tC/MWh	kgC/MWh – $kgCO_2$/MWh (Electricity generation)
Hydro, Nuclear, Renewable	0	0	0.0 – 0.0
Diesel Oil[3]	20.2	$7.271 \cdot 10^{-2}$	241.2 – 884.4
Residual Fuel Oil[2]	21.1	$7.595 \cdot 10^{-2}$	251.9 – 923.6

[3] Source: IPCC (1996).

Coal/Coke Oven[2]	29.5	$1.062 \cdot 10^{-1}$	352.2 – 1291
Natural Gas (dry)[2]	15.3	$5.508 \cdot 10^{-2}$	137.0 – 502.3

Table 2 - Emission factors for electricity generation

6. Reporting of Emission Reductions

Month	Delivered to the grid (kWh)	CO_2e offset (tCO_2e)	Plant Capacity Factor (%)
January/2002	680,462.20	341.59	9,15%
February/2002	381,563.70	191.54	5,68%
March/2002	496,474.81	249.23	6,67%
April/2002	1,462,301.00	734.08	20,31%
Total	3,020,801.71	**1,516.44**	

Table 3 – Emission reduction calculation

7. Other Impacts

The project sponsors are confident to state that to the best of their knowledge the Piratini, CGDE, Koblitz Energia S/A project does not produce any significant additional environmental impacts.

7.1 Internal Impacts

There will be no new continuous direct on-site emission sources related to the project. During the construction phase there will be direct on-site emissions related to the installation of the new boiler and generator, and to the capacity expansion of the existing transmission line.

7.2 External Impacts

There will be no new continuous direct off-site emission sources related to the project. During the construction phase there will be direct off-site emissions related to the transportation of the new equipment from the manufacturers to the site.

7.3 Permanence

The project undertaken is a permanent modification and will continue in service for the life of the facility.

8. Documents Examined

- Power Purchase Agreement between Piratini, CGDE, Koblitz Energia S. A. and CEEE.
- Invoices of electricity delivered to the grid.
- Environmental and operation licenses.