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**THE ELECTRICITY GENERATION SECTOR IN
BRAZIL: THE PERCEPTION OF REGULATORY
AND ENVIRONMENTAL RISK**

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TABLE OF CONTENTS

Section 1. Introduction.....	3
Section 2. Regulatory Framework in Brazil– Law and Policy	5
2.1. Regulatory Issues.....	5
2.2. Regulatory Agencies.....	6
2.3. Brazilian Electricity Regulatory Agency – ANEEL	7
2.4. The Electric Sector Model– Past and Present.....	9
2.5. New Regulations on Discussion	15
Section 3. Environmental Law and Policy	17
3.1. National Environmental System – SISNAMA.....	18
3.1.1. National Environmental Council – CONAMA	19
3.2. Environmental Permit Process in Brazil	20
3.3. Environmental Impact Assessment and Statement – EIA/EIS – In Brazil.....	21
3.4. Issues related to the Brazilian EIS/EIA procedure	27
Section 4. Risk Perception in Brazilian Power Generation Sector.....	30
4.1. Regulatory Risk	30
4.2. Environmental Risk.....	35
Section 5. Final Considerations.....	40
Section 6. References.....	43

Section 1. INTRODUCTION

The Brazilian public monopoly in generation worked quite well for along period, and Brazil succeeded in increasing its electricity supply capacity by 500% in between 1950-1990. In the 1990s; however, system performance has become very poor, forcing the federal government in 1993 to interfere in order to avoid a system collapse, taking over US\$26 billion liabilities in debts and increasing the price of electricity by 70% to rescue the system from bankruptcy. Despite this first intervention, the system continued to deteriorate and in 1995 the rising transmission constraints associated with the government's incapability to promote expansion was aggravated by a new cycle of utility defaults that led to a critical situation with a high risk of electricity blackouts (Mendonça and Dahl, 1999).

Numerous aspects contributed to this system crisis. The electrical system started to lose its investment capability in the late 1970s with the international debt crisis, which was compounded by a federal government tariff policy that imposed economic losses on the sector. During the 1980s, the government systematically reduced electricity tariffs trying to control inflation. During this period, the Ministry of the Finance determined electricity prices according to political and economic circumstances (Mendonça and Dahl, 1999). These artificially low tariffs and the loss of international credit reduced electric sector investments resources from 71% in 1974 to 54% in 1980, 40% in 1985 and 29% in 1988 (Oliveira and Araujo, 1996).

The threat of electricity shortages associated with the state-owned company's lack of investment capacity triggered a comprehensive reform of the electrical sector that begun with a new regulatory framework in 1993. This reform was inspired and influenced by the worldwide trend towards privatization and deregulation of electrical sectors in developed and developing countries. On account of that, in 1996 Brazilian Electricity Regulatory Agency – ANEEL was established in order to regulate the new private companies and accomplish long-term investment goals in the sector.

In spite of this reform, nowadays the Brazilian electric sector faces new challenges. The present regulatory framework and environmental legislation have been increasing the investors' risk perception. The raise on this perception

make the investors demand for higher Internal Rate of Return when deciding to invest in Brazil. Consequently, the energy price in Brazil is also higher than in other developing countries, like Chile (Kelman, 2006).

In this paper, I will discuss how the regulatory framework and the environmental legislation has increased the risk perception. To achieve this goal, on the second section of this paper we will describe the regulatory process in Brazil and the role of the Regulatory Agencies. Second, I will characterize the Brazilian Electricity Regulatory Agency – ANEEL and the effects of regulation on the Electric Sector Model, following the changes on the legislation until the present day. To conclude the section, we will also present the new regulations that have been debated on Congress.

On the third section, I will describe the structure of the environmental system in Brazil and I will explain the necessary steps to be taken by a power generation project in order to be considered environmentally feasible.

After describing the regulatory and environmental structures related to the power generation section in Brazil, the fourth section aims to analyze the issues that affect the investors' risk perception.

The final section consolidates all the aspects discussed on the previous sections, regarding the regulatory and environmental content, highlighting the critical points and proposing some issues to be further discussed.

Section 2. REGULATORY FRAMEWORK IN BRAZIL– LAW AND POLICY

2.1. Regulatory Issues

Increasingly around the world, infrastructure companies that have traditionally been run by government, because they were perceived to feature aspects of natural monopoly, are being opened up to the private sector through privatization. In such sectors – electricity, telecommunication, etc. – the art of privatization requires not only ownership transfer and control to the private sector, but also the design of a regulatory environment to enhance competition and to ensure the absence of monopoly rents (IFC, 1995).

This regulatory environment can be understood as the imposition of rules that discipline the economic agents. And the regulatory agencies can be defined as institutions with power to establish those rules in order to discipline the economic agents' behavior and improve the market (Oliveira, 2004).

The issues related to the market improvement are of special interest in what concerns to the regulation process. In the case of public utilities grants, that require long-term investments, it is important that the regulation takes into account the investment amortization and points out the necessary financing. Besides that, the regulatory contracts must protect the investors from potential political risks (Benjo, 1999).

Nevertheless; Mody *et al.* (1995) argue that the role of political instruments in the development of regulatory systems for restructured infrastructure sectors will be constrained, in part, by the legal and constitutional framework of each country. In all cases, effective regulation of privatized utility sectors, specifically in Brazil, requires the establishment of a comprehensive framework of laws, rules, and regulations that clearly identify the contractual obligations and property rights of both governments and private actors. This framework should be both transparent and enforceable (Benjo Neto, 1996).

2.2. Regulatory Agencies

The regulatory agencies in Brazil arose in the mid 1990s after the State Reform. During that time, Brazil was evolving from a strong governmental interference in the economy to a more liberal role. At that time, the State was transferring activities that used to be conducted by public companies for the private investors. Therefore; the establishment of the regulatory agencies followed the market opening process, and it aimed to stimulate new investments, strengthening free competition (Motta, 2003).

The regulation activities from the regulatory agencies are made, basically, in three areas, i) economic regulation, ii) technical and customer service regulation, and iii) facilitation of competition.

Economic regulation means to determine prices and revenue, in case of natural monopolies, secure economic and financial balance of the relevant firms, limit tariff subsidies and promote efficiency and Research and Development. Technical and customer service regulation are necessary in order to maintain the quality of service and to ensure that customers are treated with care and attention to detail, especially where they have no choice over the entity from which they buy the service. Facilitation of competition, facilitates competition through the creation of a "level playing field" for the existing agents and new competitors and by ensuring that there is adequate information for the regulatory authorities to supervise the market and prevent anti-competitive behavior (Carvalho Jr., 1997).

All regulatory agencies in Brazil are autonomous, and their directors must be appointed by the President after being confirmed by Senate. The agencies also oversee the market, bearing in mind the principals of free market enterprise, consumers' protection, free entry and competition (Carvalho Jr., 1997).

In order to assure these goals, the regulatory agency must be conceived under the public law, as an administrative institution with power autonomy, independent budget and well-defined jurisdiction (Motta, 2003). Furthermore, the regulatory entity should function as independently as the country's legal framework allows. Independence of decision-making leads to policies that best serve public utility services rather than unwise or shortsighted political concerns. Part of the independence of the regulatory agency also is

derived from mechanisms established to ensure continued and adequate funding. That is why the regulatory entity should have its own budget (Benjo Neto, 1996).

According to Benjo Neto (1996) the regulatory agency should also be organized internally along functional lines to permit maximum flexibility to adjust to market developments. Ideally, the agency should be able to establish and to restructure its own internal organization, as circumstances require. Human resource policies should be aimed at attracting qualified and expert personnel. These personnel should be challenged with substantial responsibility and given incentives to contribute individually to the overall objectives of the agency.

2.3. Brazilian Electricity Regulatory Agency – ANEEL

Since 1995, the Brazilian Electric Sector has undergone profound changes. Important laws and regulations were issued as regards the concessionary regime, tariff reviews, energy sales, rules for serving captive and free consumers, and the creation of new institutional agencies in addition to existing ones.

The Brazilian electrical system is quite complex with many unique features. It is a large system, with an installed generation capability of more than 100TW and the main peculiarity is the generation mix, dominated by hydropower, which is responsible for over 77% of the electricity supply (ANEEL, 2007). The federal government controls all new sites for development of new hydroelectric units, has the power to legislate over energy and the rights for issuing concessions or developing by itself (state-owned companies) new generation facilities.

In 1993, the Federal Government, supported by Congress, started a series of simultaneous actions to restructure and to establish new guidelines for the electricity sector. The main objective of the reform was to allow government to focus on its role as policy-maker and regulator, transferring the responsibility of operations and investment to the private sector. The Brazilian government was following a world tendency, which is a government focused on regulation, minimizing its roles on the economy and encouraging the private investment (Oliveira, 2004).

The Brazilian reform addressed two broad areas. First, it defined a new legal and regulatory framework that adjusted the existing regulation of

concessions, economic regulation of natural monopolies and regulation to facilitate competition. Second, it made institutional changes in government and in the state utilities to allow the implementation of the proposed trading arrangements and regulatory framework. The institutional changes included the establishment of a new independent regulator – The Brazilian Electricity Regulatory Agency.

The Brazilian Electricity Regulatory Agency – ANEEL was instituted, through the Law 9427 of December 26th, 1996, as an autarchy of the Federal Government under a special regime of operation, linked to Ministry of Mines and Energy, with the following competencies:

- ? Regulates and inspects the production, transmission, distribution and trade of electric energy; and
- ? Mediates between industry players and electric energy consumers;

Executing the duties below:

- ? Guarantee just rates.
- ? Care for the commercial services and attendance to the consumer quality.
- ? Mediate the relationship of electric energy industry players among themselves and with society.
- ? Stimulate and ensure fair competition in the electric energy industry as well as free access to electric systems.
- ? Regulate and inspect aimed at furthering free competition, meeting consumer needs and providing full access to electricity services.
- ? Ensure electric energy supply to low income urban and rural populations as well as those living in areas of low demographic or economic density.
- ? Educate and inform industry players and society about energy policies, guidelines and regulation.

ANEEL has financial autonomy provided by the annual collection of inspection tax paid by all energy consumers, and it also has administrative

autonomy where the Board of Directors deliberates under collegiate rules of procedure.

The agency started its activities on December 2nd, 1997, following the enactment of Decree 2,335/97, which sanctioned its structural regime. ANEEL's structure is horizontal with just two hierarchical levels working under a process management procedure.

The Agency has twenty superintendencies. They are responsible for process and organization management; finance; social communication; concession and authorization (generation, transmission and distribution); economic studies of market; hydrological studies; inspection (electricity services, generation and economic); administration of the hydro potentials, computer science, administration planning, human resources, regulation (economic, generation, transmission, distribution and commercialization of the electricity), mediation and institutional relationships.

2.4. The Electric Sector Model – Past and Present

The evolution of Brazil's electricity sector until the present model can be characterized by four phases of changes in ownership structure:

- (I) private ownership with minimal regulatory control (until 1930);
- (II) private ownership with poor regulation (from the 1930s to the 1940s);
- (III) state ownership with centralized control (from the 1950s to the first half of the 1990s); and
- (IV) mixed ownership, increasing privatization, with more sophisticated regulation (since the second half of the 1990s).

From the 1940s and through 1960s, the federal government of Brazil, with the help of the state governments, undertook the charge of assuring, through state-owned companies, the supply of most of the electricity, oil and gas consumed in the country. The Brazilian government created state-owned companies, such as Eletrosul, Furnas, Chesf, and Eletronorte to generate and transmit electricity in the southern, southeastern/midwestern, northeastern and northern regions of the

country, respectively. It also put these entities under the control of a holding company, Eletrobras (Bajay, 2006).

Several combinations of generation, transmission and distribution activities existed in the vertically-integrated structure of many utilities at that time. The policy of using federally- and state -owned companies as the main operators in the Brazilian energy supply industry succeeded up to the mid-1980s, with low prices and adequate supply to fuel Brazil's economic development (Bajay, 2006).

However, the policy had also led to a number of missteps, including:

- ? The artificially low tariffs for electricity, mirroring most public service tariffs set by the federal government, in often vain efforts to control high inflation rates;
- ? The political misuse of electricity supply and gas distribution utilities, involving incompetent and often corrupt management and the initiation of construction of several plants, particularly electric power stations, primarily to reap political benefits to some politicians, but without the necessary funding to finish them on schedule; and
- ? The unmet desire of the federal government to have substantial and fast increases in domestic production of oil and gas.

Discussions about institutional changes to correct the problems dragged through several governments and lasted nearly a decade, up to the time when a deep financial crisis in the electricity supply industry required urgent action. In 1995, the first year of his office, President Fernando Henrique Cardoso decided to sell all of the federally owned electrical power utilities to private investors and to exert political and economic pressures on state governments to do the same (Bajay, 2006).

The reform conducted by President Cardoso in mid 1990s envisaged that private investors would assume key roles as owners and operators of the power system, under the control of an independent regulator. The role of the Ministry of Mines and Energy would be limited only to empowering the regulator and providing strategic policy guidance. The state -owned generation utilities were not allowed to be major partners in new generation undertakings (Bajay, 2006).

The sector privatization generated early income for the Government but did not resolve key problems in making the power business a profitable and

reliable enterprise. Under the rules then prevailing, generators were exposed to market, thus facing both sale and price risks. If demand was too low, generators risked not to find buyers, even at low prices. Worse yet, hydropower reservoir storages are usually full during wet years, so that generators can not sell their outputs at profitable prices. During shortages, generators were often forced to supplement their output to meet delivery obligation by buying in the spot market at very high market prices. In either case, spot market price signals did not induce generation expansion by investors (Bajay, 2006).

In order to solve this problem, the government of President Lula, that succeed President Cardoso, made some changes in the institutional model of the Brazilian electric power supply industry, aiming to: (i) hold tariffs down; (ii) reduce the perceptions of high risks in this industry, while providing a fair return to investors, and (iii) connect up about 13 million Brazilians who lack electricity.

Therefore, the new model proposed by the Federal Government in 2003 and enacted by the Brazilian Congress in 2004, brought the main changes, as follows:

- ? The electricity supply market was divided into two parts, one comprising the free consumers and the other comprising the captive consumers. Free consumers choose their suppliers among independent power producers or traders whose energy requirements are met through freely negotiated bilateral contracts. The captive consumers are served by distribution utilities which transact in a pool system managed by a new entity, the Electric Power Trading Chamber (CCEE), which replaced the electricity wholesale market (MAE) organization.
- ? The new model demands unbundling, so as to avoid the charge of unjustified hidden costs by distribution companies for energy supplied to captive consumers.
- ? The tasks of CCEE are the management of long-term bilateral contracts among generators and distributions utilities and the settlement of contractual differences for all market agents.
- ? The Pool System would allow for the application of economies of scale in formulating the tariff for energy purchases; and a balanced allocation of risks and benefits of contracting (considered as a mechanism for captive

consumers' protection). The supply tariff would be the final average price based on the results of energy auctions. Distributors would only be able to purchase energy through the CCEE.

- ? A new state-owned company, the energy research company (EPE), was created to perform 10- and 20-year expansion planning for the MME. The resulting plans would be publicly discussed and eventually modified before final approval and implementation by the Ministry.
- ? To meet the forecast demand of the pool consumers, the 10-year plan would set the commissioning schedule for hydropower plant projects and thermal power plants, identifying the regional constraints, and naming the transmissions lines to be built.
- ? The procurement auctions would solicit proposals to fulfil the energy supply or transmission needs listed in the plan. The proposal requiring the least revenue during the concession period would be the winning bid.
- ? The generation plants should sign a concession contract which in turn use compulsory long-term bilateral power purchase contracts to allocate the output among all distribution utilities linked to the national interconnected grid.
- ? Meeting the forecast demand of the distribution utilities for the next 5 years should be fully assured through these long-term power purchase contracts. Special contractual arrangements are proposed for additional power purchases for unanticipated demand requirements.
- ? To minimize electricity tariff increases, the new institutional model employs two types of electrical energy auctions: one for the generation of existing plants and the other for new plants. The winning bids in the former tend to be lower than those of the latter, thus contributing to lower the average prices.
- ? Under the new rules, distributors are prohibited from generating their own power to supply their customers. Rather, they will have to bid for power from the pool system managed by CCEE.

- ? EPE, ONS, CCEE, and ANEEL will help MME to oversee the supply conditions over the next 5 years, proposing corrective measures whenever necessary, which includes setting up generation reserve margins.

On 15th March 2004, the Government Law #10,848 consolidated those changes to the Brazilian Electric Sector.

The new Brazilian Electric Sector Regulation has introduced significant changes in the Brazilian power market. The previous market-oriented regulation has not succeeded in providing economically attractive conditions for investments in power generation. The insufficient expansion of the system was the main reason of the energy shortage that resulted in the severe rationing program of 2001–2002, though low rain inflows and other issues such as the lack of well-defined economic signals, regulatory and exchange rate risks not addressed, were also to blame (Rocha and Garcia, 2006).

The current regulation, based on a centralized planning directed by the Brazilian Ministry of Mines and Energy (MME), aimed to attract the private capital investments needed for power generation expansion consistent with the characteristics and singularities of the Brazilian electrical system. The main goals of the current regulation are to guarantee enough generation, to promote reasonable tariffs at the lowest feasible cost, and to integrate social goals into the sector through a program to provide energy for every citizen (Rocha and Garcia, 2006).

The most important features of the new model are the government planning return and a stronger regulation. According to former Mines and Energy Minister Dilma Rousseff, such planning can restore market agents' confidence and attract investment through the restoration of concessions and ministry planning powers.

Another important change brought by the new model regards the hydropower concessions. The Federal Government will now offer new power concessions to private agents with feasibility studies and the first stage of the environmental licensing both completed. Besides that, each new generation contract, to be decided as part of multi-year government budget plan (PPA), will be

granted to bidders which offer the lowest price, with concessions lasting at least 15 years.

According to the new model, MME establishes ceiling prices for both “old energy” and “new energy” auctions. However, as the Federal Government is concerned with holding tariffs down, the generators fear that these ceiling prices could unrealistically be kept down, particularly in the “new energy” auctions, where high price ceilings are required to induce new generation (Bajay, 2006).

The new institutional model assigned a central role for MME and EPE which is to formulate clear and stable energy policies and realistic forward plans. Nonetheless, according to Bajay (2006), there are concerns about the ability of EPE to perform this task well at least in the short run because no government body or state-owned company in Brazil had any significant experience with an integrated expansion planning for the whole energy sector in the country. EPE's eventual success will depend on its ability to produce not only optimized but also realistic expansion plans; which it will require, besides a well qualified staff and a good data base, frequent and high level interactions with the market agents (Bajay, 2006).

At this point Brazilian electric sector is facing the following challenges (Bajay, 2006):

- (a) Difficulty to forecast electricity demand 5 years in advance and to provide a portfolio of bilateral supply contracts to meet 100% of such forecast;
- (b) Risk of MME unrealistically capping the price of the “new energy” auctions to hold down tariffs;
- (c) Eventual inability of MME and EPE to formulate clear and stable energy policies and realistic forward plans;
- (d) Need to facilitate the negotiations with the government bodies responsible for environmental and water resources regulations in the country;
- (e) Lack of definition about the roles to be played by the state-owned companies in the sector; and
- (f) Assurance of autonomy and financial resources for a stable regulatory framework.

2.5. New Regulations on Discussion

In the present days, the Federal government and the Brazilian Congress have been implementing some new legislation in order to discipline the regulatory process in Brazil. Some of this legislation is described beneath.

? **Decree 6062, from march 16th, 2007**

The Decree 6,062 establishes a program to strengthen the institutional capability and to improve the regulatory system – PRO-REG. This Decree aims to promote the coordination between the institutions that participates in the federal regulatory process and improvements on the accountability mechanism, service quality and public participation.

According to the second paragraph of the Decree, the PRO-REG must contemplate measures that:

- ? Strengthen the regulatory system, aiming to facilitate the job of all institutions;
- ? Reinforce the ability to formulate and analyze public policies on regulated sectors;
- ? Emphasize the autonomy, transparency and performance of the regulatory agencies;
- ? Improve the coordination and strategic alignment of the sectorial politics and the regulatory process; and
- ? Develop and improve mechanism for social control inside the regulatory process.

To reach these objectives the Decree creates a Consultative Committee and another Committee to manage the program, both linked to the Presidency and constituted by the Presidential Staff Office, the Ministry of Finance and ministry of Planning, Budget and Management.

These Committees must mobilize all the institutions involved in the regulatory process; formulate proposals to be implemented in institutions involved in the regulatory process; and recommend a model of excellence in regulatory management.

? **Bill (Proposed Law) 3337/2004**

The Bill 3337/2004 is known as the Regulatory Agencies' General Law. It defines rules to be applied to the regulatory agencies regarding their management, organization and social control mechanisms.

The most important points included in these projects are:

- ? Article 4th – The normative rules must be submitted to public hearing when they are interesting for the economic agents, the consumers and the public service's users. Besides that, consumers' right associations and associations related to the free competition, constituted by more than three years, can indicate up to three representatives in order to follow the new regulations' process.
- ? Article 8th – The regulatory agencies must develop an annual report about their activities highlighting the public policies' compliance.
- ? Article 9th – The regulatory agencies must sign a management contract with the related Ministry. The purpose of this management contract is to improve the regulatory agency management supervision in order to promote more transparency and social control. Moreover, the management contract is also going to be used to improve the cooperation relations between the regulatory agency and the public power mainly the relations regarding the public policies' compliance.
- ? Article 13th – There will be in each regulatory agency an ombudsman to act with the board of directors without being subordinated to them and without accumulating any other activity. The ombudsman will be nominated by the President and will be responsible for following the intern process related to delations and complaints.

Section 3. ENVIRONMENTAL LAW AND POLICY

The Brazilian environmental and legal doctrine is unanimous in affirming the modernity and adequacy of national legislation for the protection of the environment, especially from the '80s, with the promulgation of the Environmental Law (Law # 6,938/81) and the Federal Constitution in 1988. In the '90s, the Water Resources Law (Law # 9,433/97) and the Environmental Crimes Law (Law Nº 9,605/98) were also significant (Capelli, 2002).

In the Federal Constitution of 1988 the competence to rule over environmental issues followed the pattern of decentralization, which was already defined by Law # 6,938/81. Therefore, the Federal Government has the task of legislating on general rules, and States and Federal District can supplement this legislation. If there is no general rule about the issue of the concurrent competence, States will exercise the absolute legislative competence. Finally, the superposition of the general federal rule suspends the efficiency of the state law that contrasts it (Capelli, 2002).

“Section. 24. It is the task of the Federal Government, the States and the federal district to concurrently rule over:

(...)

VI – forests, hunting, fisheries, fauna, conservation of nature, soil and natural resources preservation, protection of the environment and pollution control;

VII – protection of the historical, cultural, artistic, touristic and landscape heritage;

VIII – liability for damages to the environment, to the consumer, to goods and rights of artistic, aesthetic, historical, touristic and scenic value;

Paragraph 1º. In the concurrent legislation field, the Federal Government's competence is limited to establishing general rules.

Paragraph 2º. The Federal Government's competence when legislating on general rules does not exclude the supplementary competence of the States.

Paragraph 3^o. Due to the inexistence of federal law on general rules, the States will exercise an absolute legislative competence to deal with particularities.

Paragraph 4^o. The superposition of federal law over general rules suspends the efficiency of the state law since it is contrary to it.”(Brazilian Federal Constitution, 1988).

In this way, the task of the Federal Government is to legislate on “general rules”; this means over matters and questions of relevant general and national interest, while the States will be in charge of legislating on great regional issues. The general rules are those limited to fixing guidelines or general principles which will be specified by the States to deal with regional particularities.

3.1. National Environmental System – SISNAMA

The Environmental Law (Law # 6,938/81) established the National Environmental System – SISNAMA, as the following:

“Section 6^o. The organs and entities of the Federal Government, the States, Federal District, territories and Municipalities, and also the Foundations established by the Public Power, responsible for the protection and improvement of environmental quality, shall constitute The National Environmental System - SISNAMA, with the following structure:

I – Superior Organ: The Government Council, being its duty to advise the President of the Republic, in the formulation of national policy and governmental guidelines for the environment and resources.

II – Consulting and Debating Organ: The National Environmental Council (CONAMA) aims to advise, study and supply the Governmental Council with guidelines of governmental policies for the Environment and Natural Resources, and discuss in its competence rules and patterns compatible with the environment which is ecologically balanced and essential to the quality of life;

III – Central Organ: The Environmental Secretariat of the Presidency of the Republic aims to plan, coordinate, supervise and control, as a federal organ, national policy and governmental guidelines established for the environment;

IV – Executive Organ: the Brazilian Institute of the Environment and Renewable Natural Resources – IBAMA, aims to execute and enforce as a federal organ the policy and governmental guidelines established for the environment;

V – Sectorial Organs: The organs or state entities responsible for the execution of programs, projects and for the control and verification of the activities capable of provoking environmental degradation;

VI – Local Organs: The organs or municipal organs, liable for the control and the verification of those activities, in their respective jurisdictions.”

The decentralization idea is present in the structure of SISNAMA which is harmonized in a common constitutional competence. The environmental management and; therefore, the execution of the public environmental policies in Brazil, including the verification and environmental licensing, are distributed to all the entities of the Federation.

3.1.1. National Environmental Council – CONAMA

The National Environmental Council is a consulting and deliberating organ of the Environmental National System – SISNAMA. It is a collegiate organ of great relevance in Brazilian Environmental Management, situated in the Capital Federal, and composed of a Plenary, an Integration Committee of Environmental Policies, Technical Chambers, Work Groups and Counseling Groups.

CONAMA’s competence is defined in section 8th, Law # 6,938/81, and in section 7th, of Decree # 3,942, from September 27th, 2002. The aim of its competence is to publish judicial acts with the force of law, as regards environmental licensing. Besides that, it publishes quality standards for the environment, decides administrative actions at the last stage, and demands complementary studies, and documents for environmental licensing, in the hypothetical fulfillment of an environmental impact study.

The CONAMA plenary is composed of 51 members or counselors, distributed among governmental organs (federal, state and municipal government), NGOs, Business and working unions’ representatives, of Professional entities, of the native and scientific community. In addition, a representative from the Federal

Prosecutors' Office and one from the State Prosecutors' Office compose CONAMA, with a voice but no vote.

3.2. Environmental Permit Process in Brazil

The environmental permit in Brazil is an administrative procedure that analyze whether a project has conditions to be implemented and operated according to the environmental law. If the project is considered feasible, they receive a license given by the public power (Viana *et al.*, 2003).

The environmental permit is a legal requirement established by the Law # 6,938/81 in order to follow the principles of the Environmental National Policy. The purpose of the permit is to integrate the economic activity demanded by society with the environmental protection in order to reach the social welfare (Viana *et al.*, 2003).

The process to get an environmental permit includes the following stages:

- ? **Advance License (LP)** – granted during the project planning. It approves the site and project's conception attesting its environmental feasibility and defining the requirements to be accomplished on the next stages.
- ? **Installation License (LI)** – authorizes enterprise installation according to the approved project after accomplished the requirements demanded on the Advance License.
- ? **Operation License (LO)** – authorizes the enterprise to begin its operation considering that the requests defined on the previous licenses were achieved. It also defines environmental measures to be followed during the operation.

To obtain the Advance License the entrepreneur must elaborate the Environmental Impact Assessment (EIA) and Statement (RIMA) and submit to the environmental Authority.

The Brazilian Institute of the Environment and Renewable Natural Resources – IBAMA is responsible for the environmental permit on the Federal Level; however, according to the CONAMA Resolution # 237/97, the Institute must

hear the environmental state agencies during the licensing process. The Resolution # 237/97 also establishes that the environmental permit will be done in a single level, federal or state level, and the environmental agency can demand modifications on the EIA/RIMA in order to guarantee a better technical consistence (IBAMA, 2007).

3.3. Environmental Impact Assessment and Statement – EIA/EIS – In Brazil

CONAMA Resolution 001/86 is the major Brazilian EIA regulation, establishing the principles and articles of the EIA process. Article 2nd of Resolution # 001/86 (later broadened by CONAMA Resolutions # 011/86 and # 005/87) specify the environmentally modifying activities to be submitted to the EIA process. These activities are presented in Table 1.

Table 1 - Environmentally modifying activities to be submitted to the EIA process.

CONAMA Resolution # 001/86
• Roads (motorways) with two or more lanes
• Railways
• Ports and terminals for ore, petroleum, and chemical products
• Large airports
• Oil, gas, mineral, and sewage pipelines
• Electrical transmission lines over 230 kV
• Hydraulic constructions for water resources exploitation (dams for hydroelectric projects over 10 MW; water supply and irrigation; channels for waterways, drainage and irrigation, etc)
• Fossil fuel extraction (coal, petroleum)
• Minerals extraction
• Sanitary landfills, processing and disposal of toxic and hazardous wastes
• Electrical power plants over 10 MW
• Industrial and agroindustrial complexes (petrochemical, iron and steel, chloride, alcohol, coal, water, food resources)
• Industrial districts and zones
• Wood exploitation in areas with size over 100ha
100 ha
• Urban projects (settlements) over 100 ha
• Any activity that uses vegetal coal over 10 tonnes per day
• Agricultural and cattle projects in areas with size over 1000 ha.

Source: Glasson and Salvador (2000)

Activities not included in Table 1 are initially exempt from EIA, but if they may cause significant environmental effects, they must be subject to the licensing system. State agencies must make their environmental licensing processes compatible with the stages of project implementation under the Resolution criteria and its articles. IBAMA, state and local environmental agencies can define additional guidelines and conditions (including deadlines for studies), depending on project and location environmental characteristics. The minimum technical requirements and contents (scope) of the EIA report – EIS are specified in the Resolution, which also establishes that the EIA study shall be undertaken by a skilled and multidisciplinary staff, which shall be independent of the project proponents.

In theory, the CONAMA Resolution 001/86 is reasonable, covering the main necessary aspects for good EIA practice, including:

- ? Provisions for studies of alternatives and EIA monitoring;
- ? The possibility of public participation and rules for this procedure;
- ? The existence of a link between EIA and licensing systems with the possibility for checking the execution of the EIS recommendation after the EIA and LP;
- ? Provision for the municipal authorities to require EIA/EISs;
- ? Provision for the state authorities and local authorities to make their own legislation and guidelines, supplementary to the federal regulations.

On the other hand, according to Glasson and Salvador (2000) there are some limitations to be noted, including:

- ? The provision for state and local authorities to make their own legislation and guidelines can lead to inconsistency across the country;
- ? Although there is a general scope in the CONAMA Resolution 001/86, the terms of reference for specific projects are omitted;
- ? A no technical summary is also omitted in that Resolution;
- ? The Resolution's list of activities to be submitted to EIA is limited and too rigid. In some cases, an important activity (e.g., a large industry), which probably should be subject to EIA, may remain out of this process, and some indirect or cumulative relevant impacts produced by activities not included in the list may not be identified.

The EIA system in Brazil is linked to the environmental licensing system. There is also a legal link (not administrative) between these systems and the building licensing system, which is usually carried out by the local (municipal) authorities. The building licensing procedure and the environmental licensing and EIA procedure used to be carried out simultaneously (Glasson and Salvador, 2000).

Under the EIA procedure the developer starts by applying for the Advance License (LP), which is a preliminary license given at the stage of the project's feasibility study (localization, economic evaluation, financing, project

alternatives and design). The environmental agency then verify if an EIA is required or not, based on the project's list of the CONAMA Resolution 001/86. If an EIA is not required, the process follows the common licensing system; if EIA is required, the developer must provide the EIA/EIS to be submitted (Glasson and Salvador, 2000).

If requested, a public hearing must be provided by the environmental agency (Glasson and Salvador, 2000).

Next, the environmental agency issues a finding and submit the EIS to the Environmental Council (CONAMA) where the public have another opportunity to express their opinion through their representatives. The CONAMA has a technical chamber to deal with technological aspects, as necessary. Where the EIS is approved by the CONAMA, the environmental agency gives the LP to the developer.

With the LP, the developer can apply for the Installation License (LI), presenting the executive designs of the project and the LP, which are checked by the environmental agency in order to give the developer the LI. After receiving the LI, the developer can implement the project, starting construction, removing natural vegetation, etc. When construction is finished and the project is ready for operation, the developer applies for the Operation License (LO), which is given after the environmental agency checks whether all the mitigation measures and EIS findings have been carried out.

After the LO, the developer can start the project, but this license has a limited duration and must be renewed. EIA monitoring is possible in theory; however, monitoring is not a formal practice in the Brazilian EIA procedure and even when it is attempted it is not usually accompanied and audited by the environmental agency after the project is started (Glasson and Salvador, 2000).

Brazil has chosen the Environmental Impact Assessment and Statement as instruments for the environmental permit. This procedure was legally defined on Federal Law 6938/81 that established the Environmental National Policy; and, after the CONAMA Resolution 001/86 the environmental agencies begins to require it as part of the licensing process.

For the hydroelectric power plants the legislation that establishes the environmental procedures is the Normative Instruction 065/05 from IBAMA. This instruction establishes that to begin a licensing process the entrepreneurs must

elaborate a proposal for a Term of Reference regarding the EIA/RIMA to be submitted and approved for IBAMA. The EIA/RIMA are elaborated as a requirement to obtain the Advance License (LP).

The connection between the EIS/EIA and the Advance License exist because this assessment is a previous study about the important impacts related to the construction and operation of an enterprise, therefore they provide an important approach for the environmental licensing process. For that reason, the EIA/RIMA must accomplish the following goals:

- ? To evaluate the project's environmental feasibility and provide subsidies for the Advance Licensing in the environmental agencies;
- ? To complement and organize a thematic database about the region;
- ? To provide knowledge regarding the changes that it will affect the region after the enterprise.
- ? To establish programs that aim to prevent, to mitigate and to compensate the negative impacts and also to reinforce the positive ones, promoting, when possible, a regional insertion of the project.
- ? To characterize the present and future environmental quality of the project's Influence Area;
- ? To define monitoring programs that must be initiated and/or continued during and after the enterprise implementation.

The EIS is followed by the Environmental Basic Project, the Executive Project and Forest Inventory in the licensing process. These other studies are necessary to grant the Installation License (IBAMA, 2007).

The EIS/EIA and the environmental permit process must attend the following legislation (IBAMA, 2007):

- ? Federal Law 3924/61 – Archaeologic monuments;
- ? Federal Law 4771/65 – Forest Code;
- ? Federal Law 5197/67 – Animal protection;
- ? Federal Law 7247/85 – Environmental crimes;

- ? Federal Law 9433/97 – Water Resources National Policy;
- ? Federal Law 9605/98 – Penal and administrative sanctions for environmental harmful activities;
- ? Federal Law 9985/00 and Decree 4340/02– National Conservation Units System and Environmental Compensation;
- ? State Environmental Laws;
- ? Decree 25/37 – National Historic and Artistic Patrimony;
- ? Decree 79367/77 – Water potability;
- ? Decree 95733/88 – Apply 1% of a federal project’s budget on measures to prevent or to correct environmental damage.
- ? Decree 1141/94 – Environmental protection actions and support to indigenous tribes.
- ? Decree 750/93 – Cut, exploitation and suppression of vegetation from the Atlantic Forest;
- ? CONAMA Resolution 006/86 – Environmental permit request model
- ? CONAMA Resolution 357/04 – Water bodies classification and effluents discharge;
- ? CONAMA Resolution 006/87 – Environmental permit for great electric sector enterprises;
- ? CONAMA Resolution 009/87 – Public Hearing for EIA/RIMA analysis;
- ? CONAMA Resolution 013/90 – Conservation units’ nearby area;
- ? CONAMA Resolution 009/96 – Remaining area between primary vegetation that works as animal pathway;
- ? CONAMA Resolution 249/99 – Conservation and Development Policy for the Atlantic Forest;
- ? CONAMA Resolution 302/02 – Permanent preservation areas for reservoirs and land use policy for the nearby areas;
- ? CONAMA Resolution 303/02 – Definition and limits of the permanent preservation area;

- ? IBAMA Administrative Act 122-P/85 – Authorization requirements for collecting, transporting and trading of plants from native forest;
- ? Environmental Ministry's Normative Instruction 03/03 – Endangered species;

3.4. Issues related to the Brazilian EIS/EIA procedure

The heterogeneity of Brazil is reflected in its EIS/EIA system and procedures. Despite the existence of a major national regulation (CONAMA Resolution 001/86) that is applied to all Brazilian states, the same Resolution makes it possible for each state to carry out its own policy, regulations, and practice. The more developed states have more resources to implement EIS/EIA practice than the poorer and less developed states (Glasson and Salvador, 2000).

Since the early days of EIS in Brazil, there have been a number of problems and mistakes, related to practice and to political and institutional factors, reducing its effectiveness. EIS is too centralized to the state level, which limits local awareness about environmental issues and the participation of local key actors (e.g., authorities, NGOs, and the public in general) (Glasson and Salvador, 2000).

The effective participation of the local planning authorities could be fundamental; but, unfortunately, in most Brazilian municipalities there are no human and material conditions to achieve this. The limitations of the planning process in Brazil, specifically on aspects related to the environment, restrict EIS to controlling the direct impact of the projects, rather than being used as an effective instrument to modify the development planning and policies (Glasson and Salvador, 2000).

The link between EIS and local planning is weak for project implementation. The only connection is the legal requirement of environmental licenses for the building licensing applications, but in most cases this requirement is not carried out at the proper time or is sometimes not taken into account by local authorities (Glasson and Salvador, 2000).

In several states, the environmental licensing and EIS procedures are not being applied according to the law (Law 6938/81 and CONAMA Resolution 001/86). These regulations establish that EIA/EIS have to be carried out during the LP stage; but, in most cases, this procedure is being carried out just at the LI

stage, decreasing the role of EIS as a preventive and planning instrument (Glasson and Salvador, 2000).

At the state level, the EIS process is undertaken by the state environmental agency, with a strong sectoral focus. Other state secretaries who have some relationship to environmental issues (e.g., transport and energy secretaries) are less involved with EIA directly, having only a secondary and distant participation in the process, without consultation, through their representatives in the State Environmental Council. This sectoral approach produces struggles among the environmental institutions and the other institutions who believe that EIS may disturb their own projects. A possible solution for these problems could be the implementation of secondary regulations, with the responsibility for EIS for some types of projects redistributed to the competence of other secretaries. Apart from a few exceptions, there are no secondary regulations and guidance for specific projects.) Furthermore, in the Brazilian states where environmental problems are innumerable, even the environmental agency has neither trained and skilled personnel and material resources nor political support for EIS review and other EIS procedures (Glasson and Salvador, 2000).

There are also some problems related to the assessment methodologies used in Brazil, which come mostly from international experience (e.g., some matrix methods, and the Battelle Columbus Institute methodology). Such methods need to be adapted to the conditions of the country, based on Brazilian EIS experience. In addition, indicators of environmental degradation need to be improved; in most cases, environmental data and records are few and dispersed among several government institutions (Glasson and Salvador, 2000).

In most cases, the environmental agency does not provide Terms of Reference (ToR) for the EIS of specific projects to take account of project and environment characteristics. ToRs are often made by developers, and the scoping stage may be deficient. The lack of the ToR or its inadequate elaboration results in a low quality of EIA/EISs, making EIS review difficult. The lack of environmental zoning also constrains EIA scoping and EIS review. Some EISs made by certain consultant firms are repetitive, and commentators refer scathingly to the “EIA report industry” (Glasson and Salvador, 2000).

Project alternatives are not developed adequately and environmental risk analyses and cost benefit analysis are rarely applied in Brazil. Secondary,

indirect, and cumulative impacts are also not well identified or properly assessed. Although the legislation provides for EIA monitoring, this procedure is rarely carried out in practice. Public participation under the present EIA procedure is very limited; the EISs are not in language accessible to the public, and there is no requirement for a nontechnical summary (Glasson and Salvador, 2000).

There is also little evidence of the development of strategic environmental assessment (SEA) in Brazil (Glasson and Salvador, 2000).

The EIS approval process is very bureaucratic, taking too much time for completion. The discussion of the EIS in the CONAMA is frequently influenced by political and economic pressures. Depending on a project's complexity and its implications, a complete EIA procedure may take at least a year, or even more. Consequently, it is common for the developer to begin the project implementation while the EIA procedure is being carried out. Thus, it is important to establish a time limit for the EIS review and approval by the environmental agency (Glasson and Salvador, 2000).

However, despite all the problems mentioned, all authors agree about the importance of the EIA process in Brazil, with some positive points emphasised. In some states (e.g., in the southern and southeastern states) there is reasonable EIA practice, which is improving public awareness and participation, environmental knowledge, mechanisms of negotiating among the various parties and interests involved with environmental issues, and the democratic decision-making process (Glasson and Salvador, 2000).

Section 4. RISK PERCEPTION IN BRAZILIAN POWER GENERATION SECTOR

4.1. Regulatory Risk

The most part of the investors put their money in countries with low regulatory risk; however, some of them prefer a risk situation. In that case, they demand a higher IRR – Internal Rate of Return. On the energy bid that happened in Brazil in December of 2005, many investors said that would only participate if they could get an IRR of at least 15%. Nonetheless, if they were in Chile, they would accept an IRR of 8% (Kelman, 2006).

The impressive difference between these two values occurs because investors have different risk perception from Brazil and Chile. Because Chile is considered a low risk country, the Chilean consumers pay for the energy 70% less than the Brazilian consumers do, considering the same power generation infrastructure (Kelman, 2006).

The raise of investor's risk perception in the Brazilian electric sector has been strongly influenced by three concerns. The first one is related to the Congress and the definition of a regulatory milestone.

Regarding that, Brazilian Senator Delcídio Amaral said that the lack of appropriated regulatory milestones cause juridical instability that harm the economic growth more than the lack of investments. The main problem regarding this situation is the fact that the risk perception is included on the commodities cost by the investors.

The second investors' concern is related to the Judicial System in Brazil. The reason is that some Courts of Justice ignore the existence of a regulatory agency and take other decisions that go against the technical decision made by the regulatory agency. Therefore; when the judicial system overcomes the technical decisions the regulatory process in Brazil become weaken.

The third concern refers to the regulatory agency and its autonomy. The lack of autonomy can compromise the regulatory agency independence and the affect the decision process (Kelman, 2006). On account of that, the regulatory agencies were established as institutions under special regime. This special

regime means that a regulatory agency has financial and management independence and it also guarantees that the regulatory agency is not subordinated to any Ministry, what also assure its political and decision self-rule. These characteristics make the regulatory agencies an institution from the Brazilian State and not from the Current Government (Oliveira, 2004).

The autonomy of a regulatory agency is essential to guarantee the regulatory and institutional stability. It means that the contracts will be sustained, no matter what the government's interests are, and the sector will not be manage as political tool.

Hence, the regulatory agency must not give in to government's immediate interests as it happened in Argentina where the tariffs were frozen in order to hold inflation. The regulatory agency also cannot agree with consumers' requests that eventually it will result in investments' discontinuance and consequently it will affect the service. On the same way, it must not agree with the companies in requests that it will harm the consumer.

The role of the regulatory agency is to balance the interests of these three actors – government, consumers and companies. To achieve this goal the agency must be independent to make any kind of decision and have qualified personnel. When the regulatory agency finds this balance, the investors start to see Brazil as country with low regulatory risk.

Although, regulatory agencies has an important role on reducing the investors' perception of risk, according to Oliveira (2004) some proposals from Bill 3,337/04 weaken agencies' autonomy and increase the perception of regulatory risk. The Bill jeopardizes the institutions' independence mainly on the following points: the management contract and the ombudsman.

The management contracts, proposed by Bill 3,337/04, intend to fit the regulatory activities with the government programs; on account of that, they mix the technical procedure of the regulatory agency with the government's political platform.

The ombudsman should have his/her limited function to the paper of supervision of the procedure of the agency and not discuss the merit of the adopted decisions. However, Bill 3,337/04 creates the ombudsman in order to keep the regulatory agency under constant surveillance of federal government.

This close watch allows the federal government to pressure the agencies to make decisions from its interests.

According to Congressman Picciani, responsible for Bill 3,337/2004, the Proposed Law won't weaken the regulatory agencies; on the contrary, it intends to reform the Brazilian economy environment in order to attract more investors. The Bill aims to join all the laws related to the regulatory agencies and, consequently, to consolidate the rules regarding the regulatory agencies and public service. Therefore; the government, the companies and the consumers can deal with a clear and comprehensible law.

Besides the technical independence, the financial independence has as well an important role. A regulatory agency financially dependent from the government can be compelled to make political decisions. That is why a regulatory agency must have their own budget and do not depend on government's financial transference.

Regarding that, we can highlight that Aneel's budget comes from the Inspection Tax paid by all energy consumers. According to law, this tax must be used exclusively by ANEEL in order to support its activities that benefit all consumers. However, the Federal Treasury as a contingency procedure has retained part of this tax. In 2005, the Federal Government retained the tax paid by more of the consumers' half (Kelman, 2006). With a restricted budget, a regulatory agency cannot develop its activities as expected.

Government's control and interference on regulatory agencies' activities and budget used to be seen by the investors as factor of instability. This instability raises the capital cost, pushes away the investors and promotes a resource's non-optimal allocation. In spite of that, the federal government has raising its control over the regulatory agency. One example of this is the PRO-REG, mentioned on Section 24.

In spite of the fact that the PRO-REG was created to strengthen the regulatory process; the entrepreneurs see this program as a tool to be used to interfere on the regulatory process and weaken the regulatory agencies autonomy. This perception comes from the terms of the Decree that establishes social control and efficiency indicators.

The PRO-REG intends to support social institutions dedicated to monitoring the regulatory agencies and develop indicators to measure the

efficiency and management quality of the regulatory agencies. This last point can be used to design management contracts between the regulatory agencies and the ministries. This management contract is already in Bill 3,332/2004.

Moreover, the federal government establishes on the PRO-REG a Management Committee to follow the regulatory process. However, the PRO-REG's Management Committee is totally controlled by the Federal Government through their ministries. The regulatory agencies are only part of the Consultative Committee.

Along with the regulatory issues, we have noticed that the new model implemented by President Lula presents important issues that affect the investment on the power generation sector. The perception is that the new model does not attract investment because it centralizes too much power in the government's hands. Therefore, considering the government's volatility, the energy sector is perceived as instable by the investors.

This new sector model implemented a centralized planning in order to follow the evolution of energy's demand and supply. The previsibility aspired by the federal government through the implementation of this centralized planning is, however, impossible to achieve. That is because the uncertainties related to the electric generation sector; such as the demand and supply of energy, hydrology, technology, costs, beyond others; are out of government's control. For that reason, when the government establishes a centralized planning, it creates inefficiency and inflexibility (Sales, 2003).

It has been understood that efficiency can only be achieved through competition. The competition must be encouraged as a factor to attain a fair tariff. In many ways, the new model implemented by President Lula has replaced competition for regulation. Taking into account that regulation do not substitute competition for efficiency purposes, we should regulate only sectors where the competition is absolutely impossible (Sales, 2003).

When comparing the present model, where the energy has been negotiated in a Pool System arranged by all electric distribution companies, with the previous model, where there were bilateral contracts, we realize that the sector falls into an additional cost that affects the whole system (Sales, 2003). This additional cost also raises the cost of energy in Brazil reducing their market competitiveness.

Besides that, the current federal administration ceased the privatizations carried out by the previous administration; however, it did not define clearly the roles to be played by the state-owned electricity utilities such as Furnas, Chesf, Eletronorte and Eletrosul.

State-owned companies serve several purposes. They participate both in natural or legal monopolies, and as partners of investor-owned companies, they carry out special projects of strategic or social value for the government. Moreover, they may compete with investor-owned companies and, eventually, with other state-owned companies. In the latter case, the government can employ them as price-makers, preventing market power abuse by private competitors (Bajay, 2006).

Despite some success stories, state-owned and investor-owned companies sharing competitive markets is always controversial, requiring clear-cut rules which define the objectives of the former and the boundary conditions under which they should operate. Of particular concern is the existence of a “Chinese wall” between their strategic/social and competitive activities (Bajay, 2006).

4.2. Environmental Risk

In June of 2007, there were 38 hydropower plants and 107 small hydropower plants with authorization to be built in Brazil, summing on amount of 20 GW, which represents 20% of all Brazilian energy power. Unfortunately, these numbers are hardly to be achieved. Because of problems on the environmental permit process, only 43% of these power plants have an environmental license and have been implemented (Instituto Acende Brasil, 2007).

In general terms the environmental permit process in Brazil is a long and very expensive procedure. First, the entrepreneur must fill an Application Form requesting to start the process on the environmental agency and he also must send a Term of Reference's proposal. If the enterprise does not affect federal areas or it is limited to only one state, the process must be conducted by the state environmental agency; if not, it must be conducted by the federal agency.

The Term of Reference is a detailed proposal about what is going to be done on the Environmental Impact Assessment. The environmental agency, after assessing the proposal, issues the Final Term of Reference. According to law, the stage should last one month.

With the Final Term of Reference, the entrepreneur develops the EIA/EIS and then submits it to the environmental agency for analysis. The environmental agency has at maximum one year to issue a technical report. This technical report can grant the Advance License, declare the enterprise environmentally unfeasible or ask for more information.

During the analysis process, the environmental agency can request public hearings in order to give the society opportunity to comment. Moreover, the environmental agency can ask for as many public hearings as it wants.

After the Advance License, when the enterprise was already granted, the entrepreneur must extend the environmental impact assessment and present the Environmental Basic Project – PBA. When the PBA is approved the Installation License is granted and the entrepreneur can start the construction. During the construction, the entrepreneur must implement the environmental programs proposed on the PBA. If all of them had been accomplished, the Operation License is granted.

As we can see the environmental permit process is so complex that has been seen as the great obstacle for new investments in Brazil. Consequently, there are many interrupted projects, mainly the hydropower plants projects.

About the environmental issues, Jerson Kelman, Director of the Brazilian Electricity Regulatory Agency, said that the main problem is that every environmental permit process are analysed separately. Besides that, the Federal Prosecutors' Office can sue for environmental crime the technicians from the environmental agency. Court decisions can forbid the development of studies for new plants, and unlimited environmental compensation costs grow from the Advance Licence to the Installation Licence.

Besides those problems, the National Confederation of Industry – CNI points out the slowness on environmental permit process and the superposition of competences between the Federal, State and County governments regarding the environmental permit process.

All EIA systems have strengths and weaknesses; however, the problems in developing countries such as Brazil are often more acute because of the resource constraints and economic and political pressures facing the country, as well as by the inherent limitations in procedures and legislation (Glasson and Salvador, 2000).

In addition, the Brazilian institutional framework for EIA can be seen as highly centralised, with little scope for developing expertise at the local level. There is a need to improve the role of local planning agencies in the EIA process. This approach would be compatible with the statements of the 1988 Federal Constitution, which advocated the spread of competency for environmental issues from federal to state to municipal levels.

One way forward could be for the planning bodies in the most developed or major to take responsibility for reviewing EISs under their jurisdiction. Elsewhere, the state agencies for environment could review the EISs for projects proposed in the smaller municipalities; they could also take on an EIA training role for such municipalities. It would also be useful to develop the role of statutory consultees, which have proved to be effective in countries such as the UK and which could help to make the process less sectoral and less dominated by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and/or state environmental agency (Glasson and Salvador, 2000).

Other agencies, such as universities, could have a more effective role in the Brazilian EIA process, performing consultation roles similar to those of statutory consultees and providing training and research to build up the EIA capacity. Public participation in EIA leaves much to be desired in many systems, and Brazil is no exception. There is a strong case for including a formal requirement to provide the opportunity for public consideration of an EIS, and for mandatory publicising of EIA cases in the local press (Glasson and Salvador, 2000).

Research is also needed to develop environmental impact indicators and EIA methodologies applicable to the specific conditions of Brazil (Glasson and Salvador, 2000). Other improvements in EIA procedures could include mandatory scoping, with the developer presenting draft Terms of Reference to the competent authority at an early stage in the EIA process. EIS review could be improved through training and guidance on review methods.

Monitoring also needs to be greatly improved, and preferably should be mandatory, with periodic reports presented by developers to the competent authorities (Glasson and Salvador, 2000).

It can be hoped that, with such changes, and along with the introduction of Strategic Environmental Assessment (SEA) for the higher tiers of development actions, there will be some progress in reducing the procedures–practice gap in Brazil. This should help to turn EIA into the anticipatory and leading tool it ought to be, rather than a residual and marginal add on to planning decisions already taken on political and economic grounds (and often with minimal consideration of environmental impacts) (Glasson and Salvador, 2000).

In spite of that, nowadays, the environmental issues are the main part of a hydropower plant budget. Depending on the site, the type of operation or the existence of judicial demands, the amount spent by the entrepreneurs can be much bigger than expected on the initial budget (Figueiredo, 2007).

According to ANEEL (2007), approximately 6,953 MW, from power generation projects under construction, has some kind of environmental restriction that inhibits the beginning of operation; and 1,105 MW faces severe restrictions. These restrictions result from problems during the environmental licensing, from judicial decisions and/or project environmental unfeasibility.

Another problem concerning the environmental issues in Brazil regards the licensing process and lack of standard procedures to analyze and approve the environmental impact studies. For that reason, the environmental permit is a long process with many inconsistent demands that are not compatible with the project or the Term of Reference. As consequence, usually is not possible to accomplish the deadlines and keep the expected costs.

The cost evolution of a project since the first planning until the operation stage is one of the main aspects that stem from the environmental process. The environmental cost that is estimated to obtain the Advanced License usually increases along the process. Therefore, the final budget is unpredictable and the uncertainties reflect itself on the product's price.

Another uncertainty that affects the project budget is related to the environmental compensation. The environmental compensation was established in Law 9,985/2000 and it defines that enterprises with great environmental impacts must support the implementation and maintenance of conservation units. This environmental compensation is defined by the environmental agency and must be no less than 0.5% of the enterprise total cost. However, the environmental agencies have not defined a method to calculate the environmental compensation to be paid, consequently there are no maximum limit to be charged.

The Courts in Brazil has also increase the uncertainties related to the environmental permit process and therefore increasing the investors' risk perception. That is because when an environmental agency grants a license, this license can be questioned in Court regarding the competence or the quality of the studies. When this happens, the process is suspended and it begins a long discussion about which institution must conduct the process.

One possible solution for this problem is the regulation of article 23rd from the Federal Constitution. Since the article defines that the environmental protection is a Federal, a State and a Municipal responsibility, the Federal Prosecutors' Office usually goes to the Court to question which of them should proceed with the environmental permit. If the Congress regulates this article, defining that an enterprise, whose impacts affect more than one State, should be analyzed by the Federal Environmental Agency, the conflicts between the environmental institutions and the Federal Prosecutors' Office will be minimized.

The main consequence of these issues, besides the high costs, is the long time required to approval a project. According to a preliminary report from the World Bank, the legal deadlines established in Law are far from be attained. Table 2 shows the required time to get the Advance License.

Table 2

Stages	Legal Deadline	Observed Time
Term of Reference approval	30 days	394 days
EIA/EIS approval	120 days	576 days
Public Hearing	45 days after the EIA/EIS approval	239 days
Advance License	365 days	1188 days

According to the Brazilian Association of Major Power Consumers and Free Consumers – ABRACE About 20%-25% of a hydropower plant investment is used to mitigate environmental impacts and compens ate the affected communities. Besides that, as shown on Table 2, the time required to obtain an environmental permit delays the enterprise schedule (ABRACE, 2007).

The delays related to the environmental permit process are the one of the main problems faced by those who wants to invest in Brazil. According to the National Confederation of Industry – CNI, in 2006, about 79.3% of the companies that requested an environmental permit had the process postpone due some restraint, number 5.7% higher than in 2005. Moreover, even worst, 100% of all biomass thermoelectric power plants had problems to get the environmental permit.

The research performed by CNI also brings the major problems' ranking:

- 1st – Delays on the environmental permit grant;
- 2nd – High costs demanded by the environmental agency;
- 3rd –Start a new project is expensive because the environmental agency requires a detailed study from the region where the enterprise will be installed;

Section 5. FINAL CONSIDERATIONS

The Brazilian Electric Sector Reform in 1990s was quite complex and addressed different objectives. The main one was to change the government role to policymaker and regulator, transferring the responsibility of operations and investment to the private sector. This change was imposed by its unwillingness and incapacity to finance system expansion and by the urgent necessity of attracting private investment, which is crucial to avoid an electricity supply collapse.

The government has succeeded in many aspects of the proposed reform. It has created a new legal and regulatory framework, defined new trading arrangements for the sector, implemented the necessary institutional changes in the government and in the state utilities to allow privatization, and establish and independent regulator – ANEEL. The new regulatory and institutional model is well advanced; however, we can identify some constraints regarding to the system expansion and attraction of the investments for the sector. Two of these constraints were focused on this research: the regulatory and the environmental issue.

Regarding the first constraint, along the paper we could realize that an appropriate institutional design for the regulatory agencies is essential for the economic growth. Without clear rules and trust, the private investment will not take place. Without institutions that assure investors' reliability, Brazil will have difficult to supply your infrastructure demand. In addition, the success of the regulatory agencies is associated to their independence, transparency and the definition of their jurisdiction.

Reducing the investors' risk perception represents more than new capital to be invested in Brazil. It means that this capital will be invested in Brazil for a lower rate. According to the Brazilian Chamber of Investors in Electric Power – CBIEE, the drop of 1% on the Intern Rate of Return – IRR represents a drop of 3% on the energy cost. In addition, the energy in Brazil costs 27% more than in the developed countries in account of the regulatory and political risks (CBIEE, 2005). CBIEE, however, indicates that a way to minimize the investors' risk perception is to guarantee the independence of the Regulatory Agency.

Nevertheless, the risk is not only associated to the regulatory issues. The environmental process in Brazil has been playing an important role on this

subject. The difficulties to get an environmental license and all the uncertainties and cost involved in the permit process have raised the risk and, consequently, the commodities price in Brazil.

Regarding the environmental risk, the Brazilian Energy Producers Association states that in order to reduce the risks the environmental agencies should define the terms of reference according to the type, size and location of the enterprise and, mainly, they should maintain the commitments and agreements defined during the permit process.

Another improvement on the Brazilian environmental legislation is related to the environmental compensation. About that, the Brazilian Congress has been debating a Bill that establishes that the environmental compensation should be, at maximum, 0.5% of the investment worth. This is an important step but it should come along with a method to calculate this compensation defined and approved by the environmental institution involved.

The Madeira's River Hydropower Plants is a great example to show the relevance of the environmental compensation on the project's total cost. For those projects it is expected an environmental compensation of more than US\$ 250 millions, amount that it will be paid by the energy consumers.

The environmental permit process should also be improved in order to guarantee predictability to the project's total cost. When an investor begins a project planning, he only has a far idea of how much he is going to spend to get an environmental license. Therefore, he inputs all the involved uncertainties on the product cost.

Considering all these issues, we can concluded that the sector legislation, the regulatory process and the environmental permit process must be strengthening so as to reduce investors' risk perception. If not Brazil will continuous lose investments for other countries considered more stable.

According to the Brazilian Association of Regulatory Agencies, the regulatory instability in Brazil has been already pushing away US\$ 40 billions from national and foreign investments for the last four years. However, the Courts are making important contributions to the regulatory stability in Brazil. The Federal Supreme Court are preparing to vote some dockets that will discipline the decisions related to the regulatory agencies on the inferior courts, indicating the direction that all decisions must follow. Besides these dockets, the judiciary system

in Brazil could also create courts specialized in regulation law in order to have specialized judges analyzing the regulatory agencies' decision. Therefore, the Court decision would not be so diverse from the technical decision.

A stable regulatory framework is essential for the success of the new institutional model for the Brazilian power sector. This requires that the autonomy of ANEEL should be assured, and also the financial resources necessary for a good performance of the agency. Unfortunately, this is unlikely to occur (Bajay, 2006).

The current federal administration overvalues the policy making and planning activities of MME, relegating regulation to a secondary position, an exactly opposite stand of the previous administration, whose supporters are now in the opposition. The government also sent to Congress a controversial project of law defining general rules for the external control, by the associated Ministries of State, of all federal regulatory agencies. This project raised a very strong opposition and is still being delayed in Congress, with little chance of approval (Bajay, 2006).

Another important point frequently discussed in Congress and the press is the recurrent practice of the Ministry of Planning to withhold part of the revenue of such agencies (collected through specific levies defined in laws). This happens in order to help the achievement of targets fixed by the government for public account surpluses (Bajay, 2006).

The different views between government and opposition regarding the autonomy of the regulatory agencies represent a major source of uncertainty for the market players now.

It is impossible to develop a single objective or solution that satisfies all interests, all players, and all political and social viewpoints, in a country of great diversity such as Brazil. Perhaps neither centrally directed, command-to-control, nor purely private sector approaches provide the organizational model needed to plan and manage large-scale mainly hydroelectric power systems. Nevertheless, good trade-off solutions will certainly require comprehensive management framework, with roles for representatives of electricity supply utilities, environmental agencies and federal government in long-term coordinated efforts to identify, negotiate, and implement the actions that are needed in order to improve investments in Brazil (Bajay, 2006).

Section 6. REFERENCES

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