



**THE GEORGE WASHINGTON UNIVERSITY  
SCHOOL OF BUSINESS AND PUBLIC MANAGEMENT -  
INSTITUTE OF BRAZILIAN BUSINESS AND PUBLIC MANAGEMENT  
ISSUES – IBI**

**MINERVA PROGRAM  
FALL 2009**

**THE 2008 GLOBAL FINANCIAL CRISIS AND THE  
BRAZILIAN ELECTRICAL ENERGY MARKET**

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**WASHINGTON-DC, DECEMBER 2009**

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## **1 – Introduction**

This paper presents discussions about the present crisis effects in Brazil and perspectives to subjugate it in Electrical Energy Market in Brazil, including electricity generation, transmission, distribution and commercialization. All the data such as energy consumption, GDP and Industrial Activity were collected from January 2007 until August 2009.

In Brazil, the demand for energy has experienced a significant impact from the crisis since September 2008. However, from second quarter of 2009 there is a gradual recovery of industrial activity, which consequently increases GDP and electric consumption.

Despite the present crisis, the Brazilian government needs to maintain high level of investments in infrastructure, mainly in the Electrical Energy Sector.

### **1.1 - Paper Structure**

To evaluate the Brazilian Electrical Energy Market three main key points can be proposed:

1. The current crisis is similar to other recent events, although it is a singular event in contemporary history.
2. The strength of domestic consumption was instrumental to Brazil ability to withstand an acute moment of crisis.
3. Although the crisis has generated wealth destruction, now is the time of opportunity for foreign investment in Brazil, especially in the electricity sector.

Item 2 will discuss the present financial/economic crisis and its specifics compared to other recent crises, like those occurred in the United States of America, during 1986-95; in Japan, during 1990-99 and in Asia, during 1997-98.

Item 3 will describe the Brazilian electrical energy market, including a historical review, an analysis of privatization advances and an evaluation of the “Novo Modelo do Setor Elétrico”.

Item 4 will discuss the world’s financial crisis behavior and its effects on the Brazilian economy, including the Brazilian rescue packages. This analysis describes the period from early 2007 to October 2009. Two indicators are used in this chapter to represent the effects of the global financial crisis in Brazil. The Gross Domestic Product - GDP and industrial activity were considered due to their relationship with energy consumption in the country.

Item 5 will describe the impact of demand for electrical energy in Brazil caused by crisis, including electricity generation, transmission, distribution and commercialization.

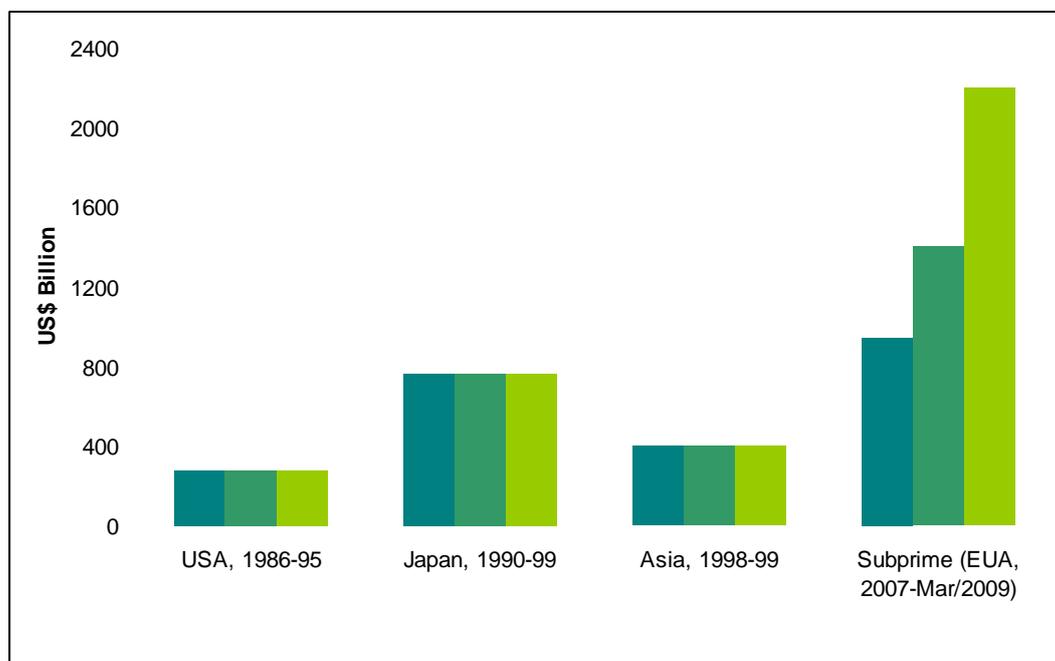
All these items confirm that Brazil is grounded in solid economic fundamentals, which enabled the rapid return of investment attraction, mainly in Electrical Energy Sector.

## **2 – The Recent World Economic Crisis**

Since August 2007, the beginning of the real estate crisis in the United States, there was an increased aversion to risk in global financial markets and progressive lack of international credit. Therefore the beginning of the current global economic and financial crisis was registered.

From economics theory, economic cycles are composed of two main phases: a phase of decline in economic activity, called recession, and a phase of expansion. These cycles have two key properties, namely: the length - measured by the number of quarters between the peak and valley in a recession or alternatively between the valley and peak in an expansion -, and the wideness - measured by the change in real Gross Domestic Product (GDP) between the actual peak and valley in a recession or between the valley and the peak in growth.

Although a singular event in contemporary history, the current crisis is similar to other recent events, such as those occurred in the United States, during 1986-95; in Japan, between 1990-99; and in Asia, in 1997 and 1998. Figure 1 shows a comparison of losses between these recent financial crises. The figure used to depict the Subprime crises estimates.



**Figure 1 - Losses on Financial Crisis (Adapted from BCB, Source: IMF)**

## **2.1 - USA (1986-95)**

The speculative bubble in the financial institutions that occurred in the United States in 1986 became known as the S & L Crisis. As described by Greenspan (2007), the name S & L (Savings & Loans) describes financial institutions specialized in deposits and mortgage loans, originally introduced in order to finance the reconstruction of the suburbs after World War II. These firms received deposits guaranteed by federal agencies, which paid 3% interest and then lent those funds in the form of 30 years mortgages with interest rates averaging 6%, i.e., their portfolios were composed mainly of long-term assets and fixed rate funded by short-term assets.

Greenspan also affirms that the S & L's were safe money markets for decades, supporting a real estate financing industry that grew a lot, with more than 3,600 institutions and US\$ 1.5 trillion in assets in 1987. But the increase interest rates caused due to inflation during 1970's, deregulation and financial fraud, the market to begin deteriorating and most of the institutions become insolvent.

The S & L's took advantage of the rapid expansion of real estate during the second half of the 70's to lend to potentially risk borrowers far beyond simple compliance that prudential rules would have allowed. At that time there were legal restrictions on the creation of a payment ceiling of deposits of S & L's, which led to movement of savers toward monetary funds.

In 1980, Congress adopted the Depository Institutions Deregulation and Monetary Control Act, which allowed S & Ls to offer deposits and removed the Regulation Q, that established limits to interest rates of savings accounts. In reality, it was a part of a rescue plan implemented during the terms of Carter and Reagan, which also included the near elimination of restrictions related to the percentage of financing in relation to the value of the property, an increase in the maximum deposits amount guaranteed by the government, the reduction of liquidity assets and favorable tax incentives for investments by citizens in residential real estate.

All this deregulation was shown to be highly prejudicial because it gave the S & L's many of the banks benefits, however, without the same banking system restrictions, causing a false sense of protection, which have replaced interest rate risk with credit risks, reaching the point of compromising speculative investments.

Only in 1989 with the establishment of Resolution Trust Corporation - RTC, which assumed the S & L's assets and distributed then in the market did the severity of the crisis decrease, but the economic consequences were still felt for many years. At the end of the crisis, this Corporation was dissolved. The losses totaled approximately US\$ 275 billion dollars.

## **2.2 - Japan (1990-99)**

In the 1980's the Japanese economy was seen as one of the most prosperous of the developed countries. During that period, Japan grew 47%, compared with growth of 38% in the U.S. and 26% in Germany, France and Italy.

In fact, a real estate bubble in a lax monetary policy environment favored excessive liquidity. Thus, the average residential price doubled between 1985 and 1990 and tripled between 1990 and 1995. The bubble was even bigger in commercial real estate. During the creation of the real estate bubble, there was a gradual deregulation of the financial sector and an increase in the amount of deposits insured by the Japanese government. A classical problem of moral hazard was established.

Just as the current crisis, the liquidity of credit had as its main target the real estate market. Bank lending continued to grow until 1998, even with the bubble burst in 1993. However, the main target of this expansion has become the corporate sector. In response to the contraction of the Japanese economy, the government intervened with fiscal packages aimed at the implementation of public works. With the slump in prices of real estate assets, total of default loans in the credit portfolios of banks increased from US \$ 450 billion in 1993 to US \$ 910 billion in 1996, causing financial institutions to collapse between 1995 and 1996. The Japanese government did not present a quick solution to the problem, because the politicians opposed the use of public resources to assist the banking sector.

After the bankruptcy of large banks in 1997, it was evident that Japan did not have the legal means to intervene in the banking sector. Successive injections of liquidity and the nationalization of two major banks were insufficient to restore confidence in the Japanese economy. Only between 2000 and 2004 did the Japanese government systematically intervene in the economy, promoting the purchase of bad loans in the bank sector.

Therefore, there are some important differences between the two crises, for example, the total bad loans made in Japan amounted to 25% - 30% of the GDP, while the total of subprime loans in the hands of private investors is around US \$ 1.5 trillion (10% of the GDP). However, the root of the Japanese banking crisis and the subprime crisis in the US is the housing bubble.

### **2.3 - Asia (1997-98)**

The Asian Tigers, given this name due to the high growth rates achieved by them since the 80s, presented signs of decline in growth, and in some cases even reducing the economy activity level, during 1997.

Once again, the situation was repeated, the ease credit and relatively low interest rates resulting in an explosion of investment, making the assets of real estate and stock markets overvalued.

Only when these weaknesses are added to some political uncertainties, such as: problems of succession in governments, issues with the borders in certain countries and doubts about the consistency of macroeconomic policy in almost all of the Southeast Asia economies, is in fact when the crisis began.

Although the Asian tigers moved a significant amount of resources, their financial systems had major weaknesses. For example, the collateral used by banks in loans had as a guarantee property with over estimated values, and with the fall in prices of these goods, the credit portfolio of banks and their financial health deteriorated.

This situation stimulated a massive outflow of investors, who quickly began to sell the shares they owned and buy dollars to operate in safer economies. To prevent the flight of capital and devaluation of local currency, the interest rates increased up to 200% per year.

## **2.4 - USA (2007- today)**

The crisis arose from the line of American subprime credit, which recently reached a worrying level of bad debt in the United States. According to the IEDI (2008), subprime mortgages were real estate loans granted to individuals without credit history or with defaults history, i.e., in general, low income households or minorities.

Encouraged by low interest rates prevailing in the United States, mainly between 2001 and 2003, citizens seek post-determined rates funding in subprime segment. Since 2003, US interest rates rose again, from 1% to 5.25% in September 2007, pressuring the people who opted for this type of loan. The peak of this crisis happened at the end of July, with the loss of various funds in this type of backed mortgages.

The relative uncertainties, regarding the exposure of financial institutions with the market for subprime mortgages, resulted in major purchase of shares in mutual investment funds, the reluctance of banks to lend to each other, creating a stagnancy of liquidity in the interbank market.

The current crisis also registers the same background, which is: the ease of attracting credit and low interest rates and deregulation of the financial sector, which was unable to monitor the financial risks involved in the American subprime credit lines.

What is unclear in the current crisis is the change in attitude of developed countries and the recommendation of the International Monetary Fund, which is contrary to what was recommended in the Washington Consensus.

Shares of the nationalization of banks, as occurred in the British bank Northern Rock (the fifth largest provider of mortgages in the UK), the purchase of bad loans and simultaneous cuts of 0.5 percentage points in the basic interest rate around the world, held by major central banks around the world, as never seen before.

Some recent events of the current crisis are important to further assess the reaction of the economy in Brazil. The main ones occurred in September 2008, which are: the rescue of mortgage agencies Fannie Mae and Freddie Mac, the request for protection of bankruptcy law of the bank Lehman Brothers, the nationalization of insurer American International Group - AIG, the breaking of the sixth largest U.S. bank, Washington Mutual (WAMU) and the nationalization of two European banks, the British Bradford & Bingley and the Belgian Fortis.

### **3 – The Electrical Energy Market in Brazil**

#### **3.1 - Historical Review**

In the mid-nineteenth century, the growth of cities and consequent boost to the urban sector of the economy caused the expansion of construction and infrastructure provision, beginning of power usage in Brazil.

The increasing usage of power justified the expansion of generating electricity by harnessing the potential of the hydraulic axis Rio-São Paulo at the beginning of the twentieth century. But only after the crisis of 1929, with the exhaustion of the agriculture export model and the crisis of overproduction of coffee, the economic policy of the country turned to the promotion of industrial development, a segment which demands more energy consumption. Until then, investments were mainly from the private sector.

Within the plans of public administration in the 30's a classical bureaucratic administration in Brazil was implemented. According to Bresser Pereira (1995), it was a government highly centralized, hierarchical, rigid and essentially based on the idea of control by process and not by results and objectives. The Brazilian state was no longer a classical liberal State, rising gradually to the social State, when it assumed an increasing number of social services.

During this period, the regulatory sector of the electricity framework was based on the “*Código de Águas*<sup>1</sup>”. From the Code, the Brazilian State had power to enact laws, grant concessions and authorizations for electricity public services, both the use of hydropower, as complementary services of transmission and distribution, it’s a clear interventionist State perspective, manifested in the increase of power of regulation of public services.

In the period of 1930-45 the State extended its regulatory and supervisory powers moving to invest directly in generating electricity, because at the Cooke Mission<sup>2</sup> it identified the sector of electric energy as a major bottleneck that restricted the growth of the Brazilian industrial sector.

The planning of the Brazilian economy went forward in the post-war period with the implementation of the “Plano SALTE<sup>3</sup>” (Health, Food, Transport and Energy) in 1947. The plan was to coordinate public spending through a program of investments. In the same period, the *Abbink Mission*<sup>4</sup> was formed which reaffirmed the importance of the energy sector, suggesting the development of private savings, while maintaining the position of the State in the supervisory and regulatory concessions and the creation of a specific fund with a bank to manage it.

From the beginning of the 50’s to the mid-60’s, Brazil experienced a period of democracy and strong economic growth based on the change of its industrial profile. Before then, the Brazilian industry was focused on the development of imports substitution, mainly in the production of perishable goods and semi durable consumption goods. Subsequently, there was greater investment in heavy industry, industry of intermediate goods and the industry of

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<sup>1</sup> Código de águas - Brazilian Decree # 24,643 of June 10, 1934.

<sup>2</sup> Cooperation group formed by Brazilian and American technicians from 1942 to 1943.

<sup>3</sup> Economic plan released by the Brazilian government of Eurico Gaspar Dutra. The goal was to stimulate the development of the health, food, transport and energy.

<sup>4</sup> Joint Commission of Brazilian-American economic studies.

capital goods. The increase in domestic consumption was also part of these changes.

During this period, specifically in 1952, the “Banco Nacional de Desenvolvimento Econômico – BNDE” was created and later would be called BNDES. The bank’s mission was to manage the administration of funds raised by compulsory loans from taxpayers’ income tax and to borrow abroad in order to finance works of infrastructure and industry.

The government of Juscelino Kubitschek (1956-61) was marked by the “*Plano de Metas*”<sup>5</sup> and the creation of most state-run power companies. This was the main instrument of economic policy: a bold plan of industrialization and development that combined the action of the State with the national private sector and foreign capital. Approximately 24% of the total investments were used for power plants projects.

Later in 1962, the “Empresa Mista Centrais Elétricas Brasileiras SA – Eletrobrás” was formed with the goal of promoting research, projects, construction and operation of power plants, transmission lines and substations for the supply of electricity in the country. Two years later, the period of the military government began. From 1962 to 1967 the Sector structure was founded to plan, regulate, monitor and expand the services of electricity until the beginning of 90’s.

Among the major milestones of this period it was the creation of the “Departamento Nacional de Águas e Energia – DNAE”, a body linked to the Mines and Energy Ministry and responsible for hiring of Canambra Consortium Consulting Engineers Ltda. that provided important studies for planning of Brazilian energy, the basis for two development plans for Brazil, the Economic Program of Action of Government (PAEG, 1964-66) and the Strategic Plan of Development (PED, 1968-70).

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<sup>5</sup> Plan released by Juscelino Kubitschek government to develop the industry, investing in roads, dams and grow the extraction of oil, all aiming to pull Brazil from its underdevelopment and transform it into an industrialized country

### **3.2 - The Market Model (1995 – 2003)**

During the 70's and 80's the Brazilian electric sector centralized all functions in government, the generation as a federal responsibility and distribution within as each state, changing to a market model, where its main function has been delegated to private enterprise.

The beginning of the 70's would be marked by the end of the “*milagre econômico*”<sup>6</sup>, a period of intense growth that was followed by two oil crises (1973 and 1979). At that time, the adjustment of tariffs was widely manipulated, even as a tool to fight inflation. Gradually, a process of economic and financial imbalance began in concessionaires, which tariff no longer reflected the real value of remunerations.

The situation worsened even more during the 80's, a period of uncontrolled inflation, which resulted in the declaration of the moratorium on foreign debt in 1987. This period was also marked by numerous unsuccessful attempts at stabilization (Cruzado Plan, Summer Plan, Collor Plan), success was only to occur in 1994 with the “Plano Real”. Noteworthy is the ratification of the Brazilian Constitution in 1988.

As a result, government wide crisis developed, which was defined primarily by the fiscal crisis, the crisis of the mode of economic intervention and the crisis of the state apparatus. In this context the *Washington Consensus*<sup>7</sup> emerged with its neo-liberal thought in 1989.

The fiscal crisis of the State, resulting from the higher international interest rates related to the increase in American interest rates, was crucial in inhibit future investments in the infrastructure sector. Thus, the government tried

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<sup>6</sup> Period between 1968 and 1974, in which the Brazilian economy would go through a notable expansion, reflected in accelerated growth of gross domestic product (GDP) and inflation stabilization at levels between 20 and 25% a year.

<sup>7</sup> Expression coined by British economist John Williamson to define a list of policies to overcome economic crisis in Latin America, which were imposed by the United States government in the negotiation of foreign debt.

to deploy a model in which the State assumed the functions of regulation, including that of the electricity sector, replacing the function of private investors.

It was during this period that the National Privatization Program - PND<sup>8</sup> was launched in 1990. The main legal instrument used was privatization, which had among its objectives: a) adequacy of state functions with transferring to private enterprises activities unduly used by the public sector, such as electricity and telephones; b) improvement and reduction of the public debt profile to decrease the country's vulnerability; c) investment resuming; d) modernization of the industrial park to increase national competitiveness in a globalized market and e) enhancement the stock market.

According to Ferreira (2000), the energy sector privatization contributed to the reduction of public debt and to the fiscal adjustment needed to sustain long term growth. The break with the old centralized model brought fundamental changes to the restoration of energy sector investments.

The tariffs were uniform throughout the country and guaranteed a return of at least 10% of the enterprises assets. Later the concept of price ceiling appears which reassured investors in relation to the readjustment. Moreover, the charges of electricity generation and transmission were separated.

The old concessions would be renewed or new ones granted only after the division of the activities of generation, transmission and distribution, which later became known as the deverticalization process.

The concept of independent producer of electricity was introduced. In the old model, the generators could only produce energy for their own consumption or to sell through distribution concessions. Subsequently, it was possible to sell energy to "free consumers".

With the hiring of American company of consultants and accountants named Coopers & Lybrand by Eletrobras, the government

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<sup>8</sup> Established by Brazilian Law 8,031 of April 12, 1990.

implemented its recommendations, mainly relating to: a) creation of a Wholesale Electricity Market, b) the establishment of the initial contracts to create a transition to the market model, c) the unbundling of transmission assets and the creation of an Independent System Operator – OIS, responsible for the management of the network transmission (core network), d) the organization of activities and financial planning in the new scenario, which covered a period of 25 years.

MAE also known as the Wholesale Electricity Market (1998), was the forum for setting the price points for energy sold and for formalizing bilateral contracts between generators and distributors or between independent producers and free consumers. In addition, MAE established a price for the energy, equivalent to the cost of short-term marginal energy generation.

The National Electrical System Operator – ONS, called OIS in the Coopers & Lybrand Consulting study, was also established in this sector model and had as its main objective the maintenance of technical benefits of the centralized system that had been created to improve the use of water resources, the main resource for electricity generation in Brazil until today.

To implement the competitive electrical energy sector model, in 1996 the National Agency of Electric Energy - ANEEL was created and established as autonomous public institution with independent directors. ANEEL's mission is to regulate and supervise the production, transmission, distribution and trading of electric energy in accordance with the policies and guidelines of the federal government.

### **3.3 - New Model (2004 -2009)**

Although the privatization process achieved some success at the end of the 90's, the investment attractiveness in the expansion of the electricity sector did not occur as expected. With the Increasing time of construction of the large hydro power plants, large dams were progressively depleted, culminating with the supply crisis, commonly known as the blackout crisis. According to the National Energy Balance (BEN 2008), the crisis led to a reduction in the total

consumption of 6.6% between 2001 and 2002, with immediate repercussions on the Brazilian Gross Domestic Product

To combat the crisis installed in the electrical sector, the government established a crisis Board of managers with the purpose of administering the rationing program and the Energy Emergency, which established an energy lease contracted from thermal power plants based on fuel oil. The payment of these plants (R\$ 100.00 / MWh turned off and R\$ 288.00 / MWh in operation) was only possible with the creation of emergency fees.

In these circumstances, the new model was introduced in the energy sector in 2004, bringing a series of changes to adopted practices. The main focus was based on the affordable tariff, system universalization and the return of energy planning. In institutional terms, the government established the Energy Research Company - EPE, the Monitoring Committee of the Electricity Sector - CMSE and the Board of Electric Energy Commercialization - CCEE.

The Energy Research Company - EPE is subordinate to the Ministry of Mines and Energy, which is responsible for long term planning of the energy sector. Formally their aim is to provide services in the area of research and development, to support the planning of the energy sector, such as electricity, oil and natural gas and its derivatives, coal, renewable energy sources and energy efficiency, among others.

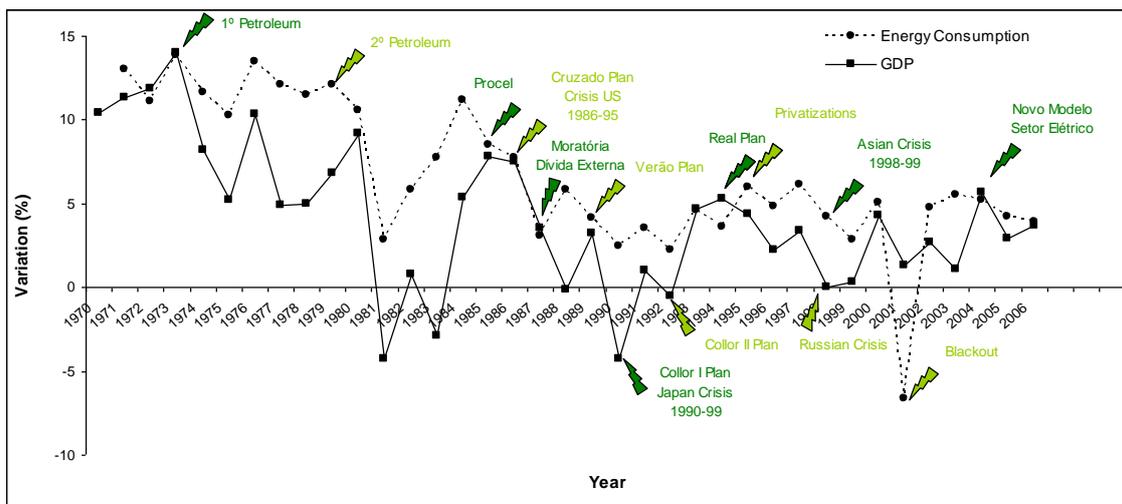
Different from EPE, the CCEE an association of the categories of Generation, Distribution and Trading segments was established to give continuity to the activities of MAE, whose formation was directly related to the creation of the free market. CCEE plays an important role to facilitate the buying and selling of electric energy in order to register and administer the contracts between generators, traders, distributors and free consumers. Their purpose is to facilitate the marketing of electricity in the National Interconnected System in Environments of Regulated Procurement and Free Contracts. Additionally, CCEE settles accounting and financial transactions made in the short term.

CMSE was established with the objective of continuously monitoring and evaluating the continuity and security of energy supply throughout the Brazilian national territory. It is composed by representatives of the Ministry of Mines and Energy, the National Electric Energy Agency, the National Petroleum Agency, the Board of Electricity Trade, Energy Research Company and the National Electric System Operator.

In operational terms, the main change was the return of planning, before the market model was conducted by private agents. The electric power was recognized as key and strategic for the development of the country and a function of state planning, which was borne by the EPE.

Another innovation was the introduction of energy auctions by the lower tariff, allowing the planning the expansion of generation to the balance between supply and demand in the Environments of Regulated Procurement - ACR, for generators and distributing exclusive, with direct consequences in reduced price tariff. In Environment Free Procurement - ACL prices are freely negotiated, involving generating, marketing, importing, exporting and free consumers.

Other changes will be discussed in the following section. Figure 2 illustrates the evolution of change in GDP and in the consumption of energy in Brazil since 1970.



**Figure 2 – Historical Evolution of GDP and Energy Consumption in Brazil.**

## **4 - The Effects of the Present Global Financial Crisis in Brazil**

Studies by the IMF (World Economic Outlook 2009) indicated that recessions associated with financial crises, or recessions that began at the same time or immediately after the onset of the financial crisis, were the most serious and longest lasting, especially when configured in globally synchronized recessions. This emphasizes the fact that the United States plays a key role in these recessions influencing both the severity and duration of the episodes.

Two indicators are used in this chapter to represent the effects of the global financial crisis on Brazil, which are: the Gross Domestic Product - GDP and industrial activity. These two parameters were considered due to their relation with energy consumption in the country.

### **4.1 - Gross Domestic Product**

Between 2006 and third quarter of 2008, the Gross Fixed Capital Formation (FBKF) in Brazil grew, consistently above the GDP, forming the largest round of investment in the country in the last thirty years. In fact, there was a continuous process of expansion of investment to support high growth rates.

The virtuous cycle was only interrupted after the last quarter of 2008, under the effects of the current global economic crisis, which are evident when observing the change in the GDP. Even with this reduction in the last quarter of 2008, the entire year recorded a cumulative growth of 5.1%. This outcome reflected the dynamism of economic activity of the first nine months; however, growth rate was still lower than the 5.7% achieved in 2007.

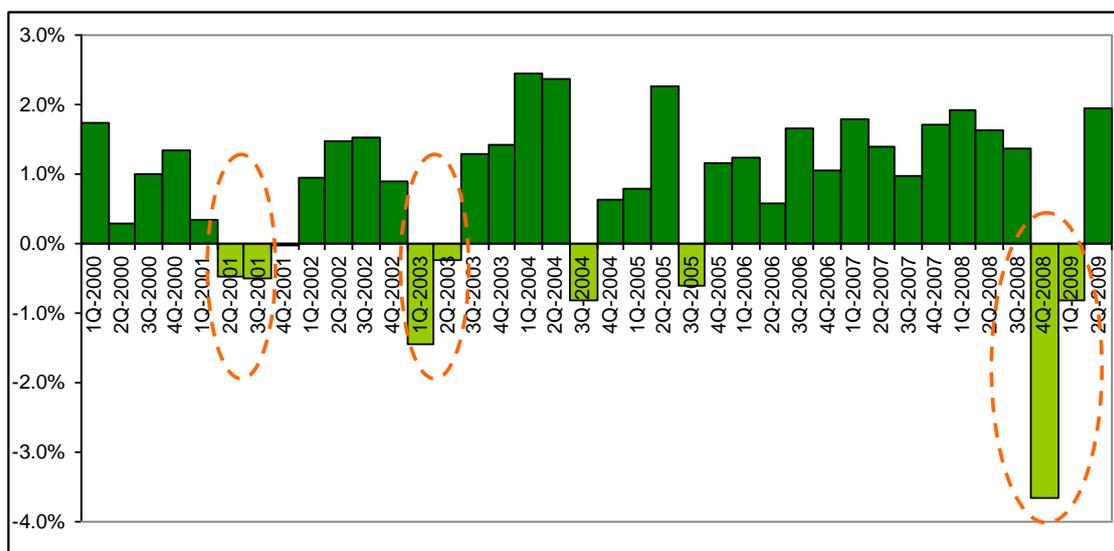
According to the Inflation Report of the Central Bank of Brazil - BCB (2009), the evolution of GDP, from the viewpoint of production, shows reduction of 7.4% in the production industry, followed by marked decline in the agricultural sector of 0.5%, and in the service sector of 0.4%.

Investments represent the most volatile part of the GDP, as they grow faster during periods of economic upturn and decrease in the same way

during economic retraction. According to surveys of IBGE (2009), investments showed a decrease in the first quarter of 2009, a drop of 14% compared to the same period in 2008, thus highlighting the negative GDP.

This information indicates that Brazil entered into a technical recession, which is characterized by two consecutive quarters of shrinkage of the economy. The measurement of two quarters was adopted by international conventions, without considering any specific concept. According to the National Bureau of Economic Research - NBER, for example, the U.S. has been in a recession since December 2007.

Historically, this is the first recession since 2003, during which the Brazilian economy collapsed 1.44% in the first quarter and 0.23% in the second. In that year, however, the GDP recovered and closed at a high of 1.1%. Before that, the last recession was recorded in 2001, when Brazil had three quarters of GDP decline, affected by the attacks on the *World Trade Center* in the United States and a crisis in the supply of electricity. Again, however, the economy recovered by the end of the year and the annual GDP rose 1.3% (Figure 3). In the second quarter of 2009, Brazil had a positive GDP again.

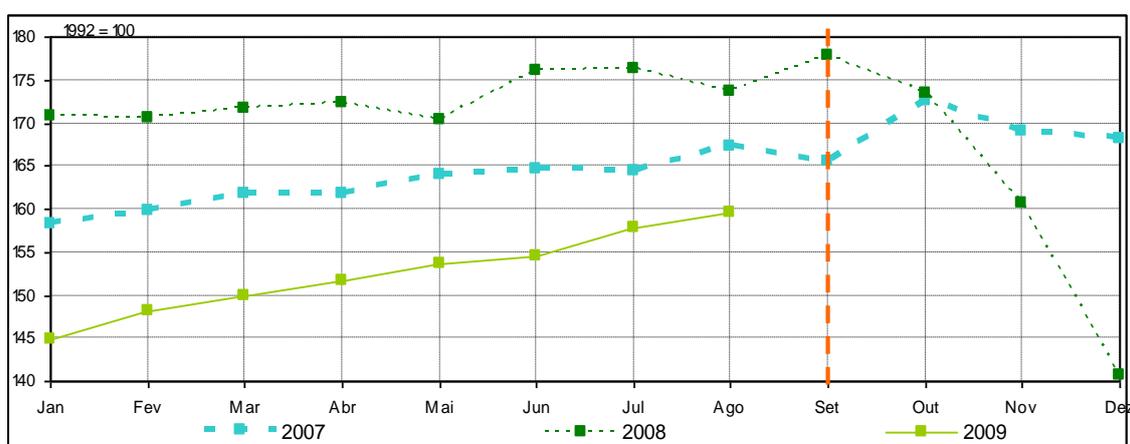


**Figure 3** - Change of GDP Quarter / quarter immediately preceding (Source: BCB)

## 4.2 - Industrial activity Industrial Activity

The industrial sector is percentage wise the highest consumer of electricity in Brazil. Accordingly, EPE (2005) indicates that areas where there is predominance of industrial consumption tend to have a higher *load factor*<sup>9</sup>. Areas with predominance of residential consumption often have lower load factor. Therefore, the subsystem Southeast / Center-West shows the highest load factor in the Brazilian Energy Market.

From the supply side perspective, the industry was exercising leadership in the expansion of the Brazilian economy before the advent of the current phase of the international crisis. The fall in GDP in the last two quarters in comparison to their immediately preceding quarters shows the retraction of credit in the purchase of durable goods by the industrial sector and especially the crisis of investment (Figure 4). However, starting in July the industrial activity increased to levels comparable to 2007's, showing a gradual recovery of this sector.



**Figure 4** - General Industrial Production in Brazil (Jan/2007 to Apr/2009).  
Source: IBGE.

Besides production, inventory stocks may indicate the level of industrial activity. Blinder and Manccini (1991) assess that in a typical

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<sup>9</sup> Defined as the relation between the energy load in average MW and the maximum demand of the system measured in MWh/h.

recession, the reduction of inventory represents the majority of the reduction of the gross domestic product. On the other hand, the Inflation Report of March 2009, published by the BCB, indicates that between May/2007 and August/2008, during a period of expansion of sales and production, about 5% to 10% of Brazilian companies had insufficient stocks. Since the deepening of the crisis, all companies surveyed have reported an excessive accumulation of inventory.

All subsectors within the industry showed negative rates. The most pronounced drop occurred in the processing industry (-12.6%), influenced mainly by the reduction of production of machinery and equipment, metallurgy, automobile, furniture, clothing and footwear.

Another segment strongly influenced by the crisis, which has a direct effect on the BM & FBOVESPA<sup>10</sup> are Petrobras and Vale do Rio Doce, which represent assets with the greatest influence on the Ibovespa<sup>11</sup>. Mineral extraction suffered a reduction of -1.1%. The drop was not larger because the extraction of oil and natural gas rose 6.5%, while the extraction of ferrous ores suffered a bitter fall of 38.1% in the first quarter.

#### **4.3 - Brazilian Rescue Package**

The governments' actions to minimize the effects of the crisis in Brazil were not effectively applied in September 2008, after the fall of the U.S. bank Lehman Brothers. In fact, a series of measures to try to prevent the deterioration of the financial system and the sectors affected by the crisis were implemented. The main actions are listed below in chronological order:

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<sup>10</sup> The BM & FBOVESPA S.A.- Stock Market, Merchandise and Futures was created in 2008 with the integration of the Merchandise and Futures Market (BM&F) and the Sao Paulo Stock Market (BOVESPA).

<sup>11</sup> The Bovespa index is the most important performance indicator of average prices of the Brazilian stock market. Its relevance is due to the fact that Ibovespa portrays the behavior of the main roles traded on BOVESPA and its tradition as the index maintained its integrity throughout its history without any methodological change since its implementation in 1968.

- 9/19/2008 - In response to scarcity of credit and boom of the dollar in Brazil, the Brazilian Central Bank announced an auction of US\$ 500 million with commitment to repurchase after 30 days. With this operation, the BCB "lent" the dollars to financial institutions during this period and the resources were used for the banks to finance Brazilian exports.
- 9/24/2008 - Lack of external credit affects small and medium banks in Brazil. The Central Bank announced the first change in the collection of compulsory deposits. Therefore, the BC ensures the injection of R\$ 13 billion in the market.
- 10/06/2008 - Government published the Provisional Measure No 442, which gives more power to BC to work during the crisis, giving the Central Bank the authorization to buy the credit portfolios of banks in trouble in Brazil.
- 10/22/2008 - Government published the Provisional Measure No 443, allowing the Brazilian public banks, Caixa Economica Federal and Banco do Brasil, to buy stakes in financial institutions in the country without going through a bidding process. In the same day, the government signed Decree No 6613, eliminating the IOF rate (Tax on Financial Operations) for implementation in the capital market, lending operations, and external financing.
- 10/29/2009 - Central Bank of Brazil and the Federal Reserve announced the establishment of a line of swap (exchange) of U.S. dollars for Brazilian reais in the value of US\$ 30 billion. Caixa Econômica Federal opened a credit line for working capital of \$ 3 billion for the construction companies.
- 11/12/2008 - Caixa Econômica Federal released US\$ 2 billion to finance consumer goods directly to retailers and encourage the Brazilian economy, including the purchase of appliances, electronics, furniture, TV and video, as well as a construction material.
- 11/16/2008 - Government published the Provisional Measure No 447, amending the dates of tax payments for the Federal IR (Income Tax)

which is automatically collected, the contribution of Social Security, PIS / COFINS and IPI (Tax on Industrialized Products ).

- 11/21/2009 - The government issued the Decree 6655, which reduced the tax on Financial Operations - IOF on purchases of motorcycles for individuals. The rate moved from 3.38% to 0.38%.
- 12/01/2008 - National Bank of Economic and Social Development - BNDES created a new line of working capital to Brazilian companies, of up to R\$ 6 billion.
- 12/11/2008 - The federal government announced measures to inject US\$ 8.4 billion into the economy. Among the main changes is a new income tax scale, and reductions of the IOF (Tax on Financial Operations) and the IPI (Tax on Industrialized Products) for manufacturers.
- 12/16/2008 - The National Monetary Council - CMN approved the release of funds from the Credit Guarantee Fund - FGC for small banks.
- 1/22/2009 - The government released additional resources for the BNDES in the amount of R\$100 billion for the years 2009 and 2010. This money will be available for investments in gas and energy, capital goods and infrastructure, among other sectors. It also guarantees investments on PAC (Growth Acceleration Program) and Petrobras.
- 3/30/2009 - The government extended the reduction of the Tax on Industrialized Products - IPI for the automotive sector until June, provided that jobs at the automakers are maintained. It also extended the tax benefits for purchases of motorcycles and construction materials (reducing many to zero percent tax rate).
- 4/15/2009 - The government announced that it would reduce the levels of the federal government's fiscal targets this year with the goal of having more money to invest in times of crisis.
- 4/17/2009 - The Ministry of Finance expanded the list of building materials that have exemption from IPI tax in the subsequent three months.
- 5/21/2009 - The Ministry of Labor announced its intention to extend unemployment insurance to the more than 216,500 workers that were laid-off in December and January.

- 6/15/2009 - Banco do Brasil announced the extension of credit to micro and small enterprises to R\$ 11.6 billion and reduced rates for transactions in receivables (discount for checks and duplicates) and working capital.
- 7/13/2009 – CAMEX (Foreign Trade Board) kept the reduction of the import tariff on capital goods, computer and telecommunications until December 2010.
- 8/13/2009 - The National Treasury made a contribution of R\$ 500 million fund for loan to small and medium enterprises. This fund already had R\$ 600 million.
- 8/18/2009 - Camex (Board of Foreign Trade) published a list of 259 machines and equipment that would have their import tariffs reduced. The main sectors benefiting from the import are: power generation (53.86%), petrochemicals (8.67%) and textiles (7.17%).

## 5 – Monitoring the Brazilian Electricity Market Crisis

Not just in Brazil, but on a global level, demand for energy has experienced a significant impact from the crisis. IEA (2009) estimates that the overall global consumption of electricity could shrink more than 3.5% this year, making this the first contraction since the Second World War. In the OECD countries, the demand for electricity in the first quarter of 2009 dropped by 4.9% as compared to last year. In China the demand fell 7.1% in the last quarter of 2008 and more than 4.0% in the first quarter of this year.

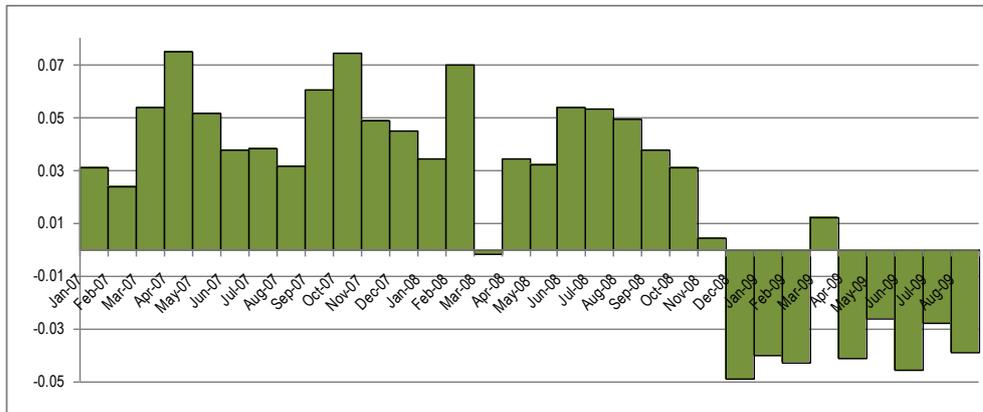
In Brazil, the fall in consumption follows the global trend. Data from the National Electric System Operator - ONS indicates that there is significant reduction in both the *energy load*<sup>12</sup> and the *demand load*<sup>13</sup>. On the supply side, when comparing the monthly consumption of electricity of the National Interconnected System - SIN with the same month from the previous

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<sup>12</sup> Defined as the total energy required to be served by the electric system. (generation, transmission, and distribution). In reality, it is the electrical energy load under the supply scope.

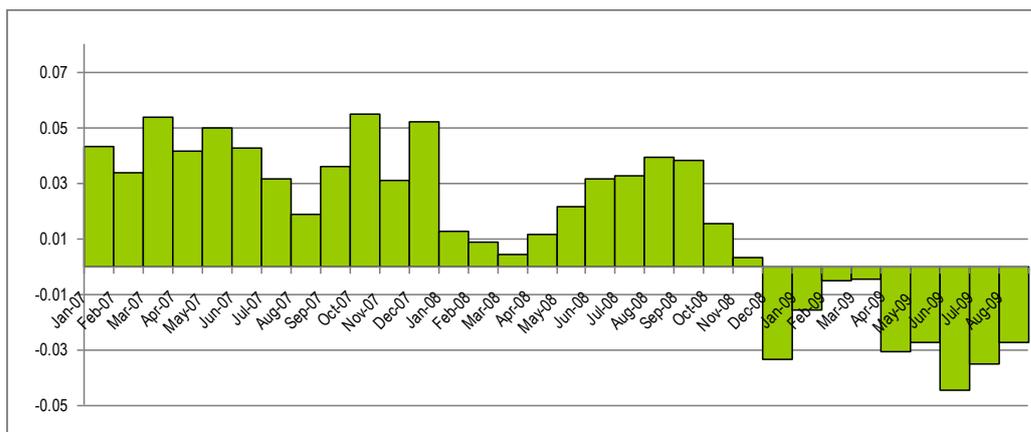
<sup>13</sup> Defined as the demand directly measured by the consumers.

years, figure 5 showed that there is already in September 2008, a lower rate of growth than in 2007, but only in December was there a reduction in supply. In fact, with the slowdown in industrial activity, the crisis created an oversupply of electricity.



**Figure 5** –Energy Load in GWh: month / same month of previous year (Source: ONS)

In relation to demand (Figure 6), it appears that even during September of 2008 there was growth in energy consumption; as of October there was a gradual slowdown, moving towards a retraction in December, which continued until May. However, from July the electricity consumption increased to levels comparable to 2007 level, showing a gradual recovery of industrial sector.



**Figure 6** – Demand Load in MWh / h: month / same month of previous year (Source: ONS)

### **5.3 - Generation**

As already noted in the previous paragraph, energy generation has been presenting the following retractions. During the public auctions A-3<sup>14</sup> and A-5<sup>15</sup> that occurred last year, as recorded by there administrative procedures of the National Agency of Electric Energy – ANEEL, were two cases where bidders used the current financial crisis to support changes in their bids. These two cases are described below.

#### **Case 1**

*Situation* - At the Auction No 2 / 2008 (A-3), the company Guariroba Water Environmental Ltda., the successful bid winner, has not given the timely *Garantias de Fiel Cumprimento*<sup>16</sup> for the bid. All the reasons used to successfully avoid administrative sanctions have been guided by reasons involving the global economic crisis. They explained that the business of generating power in the pre-operational phase was, in most cases, affected by economic-financial crisis which causes serious restriction for funding due to the lack of liquidity in the short and medium term. In this case the company was requesting a time extension.

*Decision* - Refusal. ANEEL did not identify reason for changing the time originally planned for the bid, mainly because a) extending the deadline would violate the equal treatment of participants, or vendors that supported their performance guarantees, and rather would grant special treatment to the participants, b) the other companies and consortia participating in the same auction deposited their respective guarantees, which demonstrated that

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<sup>14</sup> Bids for the purchase of energy by new energy generation enterprises that took place three years prior to year “A” (the year provided to start the supply of electric energy)

<sup>15</sup> Bids for the purchase of energy by new energy generation enterprises that took place five years prior to year “A” (the year provided to start the supply of electric energy)

<sup>16</sup> The stage cycle of the finalizing of the contract which is necessary for the administrative act to be considered both flawless and finished. (Law No. 8.666/93). Public Bids No. 2 / 2008 (A-3) and 3/2008 (A-5), amounting to a value of 10% and 5%, respectively.

obtaining financing is possible, c) the increased costs to obtain the guarantees, or even the reduction of the internal rate of return does not justify the delay, due to the fact that the future permits may be transferred to other controllers. Maintain the implementation of the Guarantee.

## **Case 2**

*Situation* - At the Auction 3 / 2008 (A-5), the company COSAN Centroeste S/A Açúcar e Álcool, the bid winner, requested a deadline extension for the submission of the Assurance of Faithful Compliance. The company used the effects of global financial crisis to explain the turbulence in international finance that impacted the security sector, and in this case would require a re-collection of their resource structures and funding. However, emphasizing that such an extension would not delay the date of energy generation.

*Decision* - Refusal. ANEEL did not identify reason for changing in the originally planned time for the bid. In its decision, the Board explained that the date completion of the auction was completed, or on the day of the soft offering, the alleged "crisis in the financial market" was already public knowledge and was subject to presented pricing proposals and served to discourage the participation of other more risk-averse potential competitors.

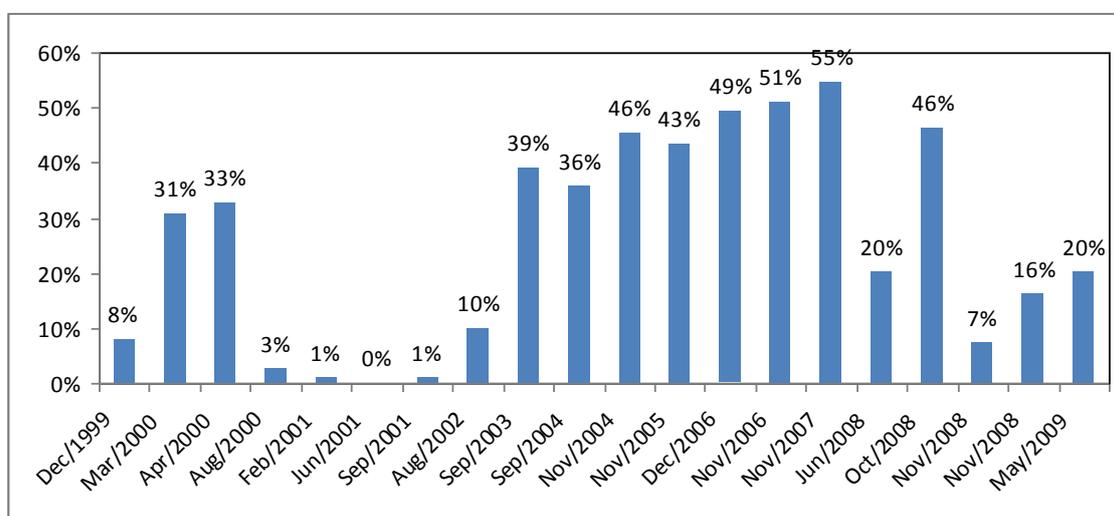
The current economic environment does not discourage entrepreneurs with interests in construction and marketing of energy generated by small hydroelectric plants - PCH. On the contrary, according to the `Medida Provisoria` n 450/2008 there has been a gain in the security sector, mainly due to the creation of the Electric Energy Enterprise Guarantee Fund – FGEE; the fund guarantees that banks will finance the construction of hydroelectric plants and transmission lines.

## **5.2 - Transmission**

Transmission is one of the two segments of the Brazilian electric energy market regulated as a natural monopoly. With unique characteristics in the world, due to both size and scope, composed in 2008 of more than 90

thousand kilometers of lines and operated by 64 utilities, the system of production and transmission of energy known as the National Interconnected System - SIN is able to promote the exchange of power between regions within a country as vast as Brazil.

The bidding companies, upon winning the public bids promoted by ANEEL, are subject to regulations that the transmitter receives each year, known as the Permitted Annual Revenue- RAP, as provided for in the bid contracts. According to ANEEL (Figure 7), the auctions of transmission lines are alternating between high moments and inexpressive premiums.



**Figure 7** - Discount Auction of Transmission Lines (Source: ANEEL)

Studies conducted by the CBIE (2008) suggest that the discount auction in 2008 was far below that seen in recent years, as the causes justify the risk of credit shortages at the end of the year and governmental involvement.

It would be precipitated to attribute the current financial crisis to the low premium recorded since November 2009. It is certain that there are many variables that to directly influence the premiums, such as location, the size of the lot and extension of the transmission lines. While the bids on smaller sizes have lower premiums, higher premiums are made in higher sizes.

Another issue that makes the premiums a heterogeneous sample of discount is the reference prices. As of January 2009 these figures were subject to review by ANEEL, which allowed an update of costs provided by Eletrobrás.

However, some features may be listed. For example, the large presence of state-run consortia enterprises and the relatively low level of participation by foreign groups. The logic is that public companies provide more security to the participants. This attitude can be seen through the government intervention in the transmission segment of the electricity sector.

While the global financial crisis causes investment cuts in various sectors worldwide, in Brazil, within the transmission segment, the perspective is for the maintenance of investments already planned for following year, precisely because of the auctions have been previously conducted and contracts already signed. Moreover, there is credit provision, provided mostly by the National Bank of Economic and Social Development, for an investment of \$ 10 billion for the period 2009-2011.

### **5.3 - Distribution**

Currently, the distribution market of electric energy in the country is served by 64 utilities, either state-owned or private. The state-owned utilities are under the control of federal, state and municipal governments. In all, 47 million consumer units are serviced, of which 85% are residential consumers in more than 99% of Brazil's municipalities.

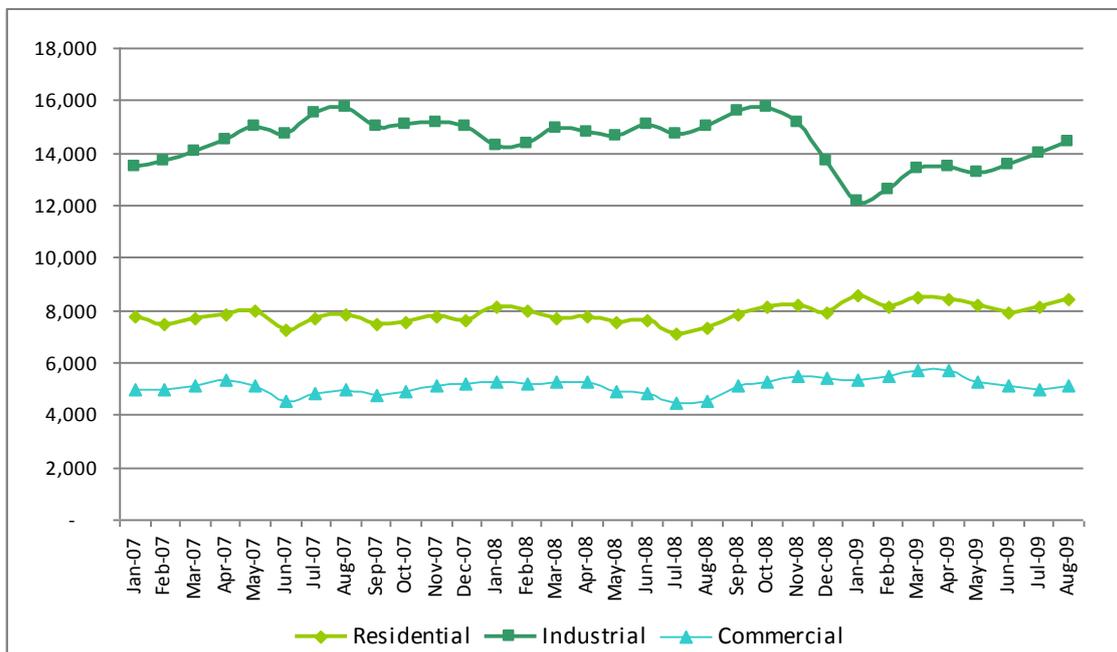
This year, the electric distribution segment is also suffering the impact from the current recession. At first, the annual adjustments appeared to contribute to the worsening crisis. Due to the burden of the electrical energy tariff which is a basic input for many electricity intensive industries.

But when analyzing the reality of the sector, it is striking to see the negative burden that the tax load puts on the production sector, especially on

the industry, which soured during the first two months of this year showing a drop of more than 15% compared to the same period last year.

Another difficulty faced by distributors relates to the energy from Itaipu<sup>17</sup>. As the contracts for commercialization are done in U.S. dollars and since Brazil adopted a floating exchange rate system, the segment has been significantly influenced due to the valorization of the dollar against the real, occurring since August 2008.

Even with the effects of the crisis, the consumption of electric energy maintained reasonable load levels, confirming that domestic consumption, to a certain extent, maintained balance, with an apparent drop in consumption in the industrial sector as of September 2008. This behavior can be seen in the graph in Figure 8, in which there is marked increase in residential and commercial consumption, shown against the decline in the industry consumption.



**Figure 8** - Statistics of Electricity Consumption by Sector in Brazil in GWh (Source: EPE).

<sup>17</sup> Bi-national hydroelectric power plant (Brazil and Paraguay) which is considered the largest in the area of energy generation.

#### **5.4 - Commercialization**

The Process of Energy Commercialization is governed predominantly by contracts of purchases and sales of energy, which are required to be registered with the CCEE. When commercialization is formalized by contracts known as Contracts for Electric Power Commercialization in a Regulated Environment (CCEAR), these relationships are created through the Environment of Regulated Procurement - ACR.

The ACR has as one of its main characteristics operations of buying and selling of electric power between sellers and distribution agents, preceded the bidding and, therefore, with public trading prices and regulations by the government.

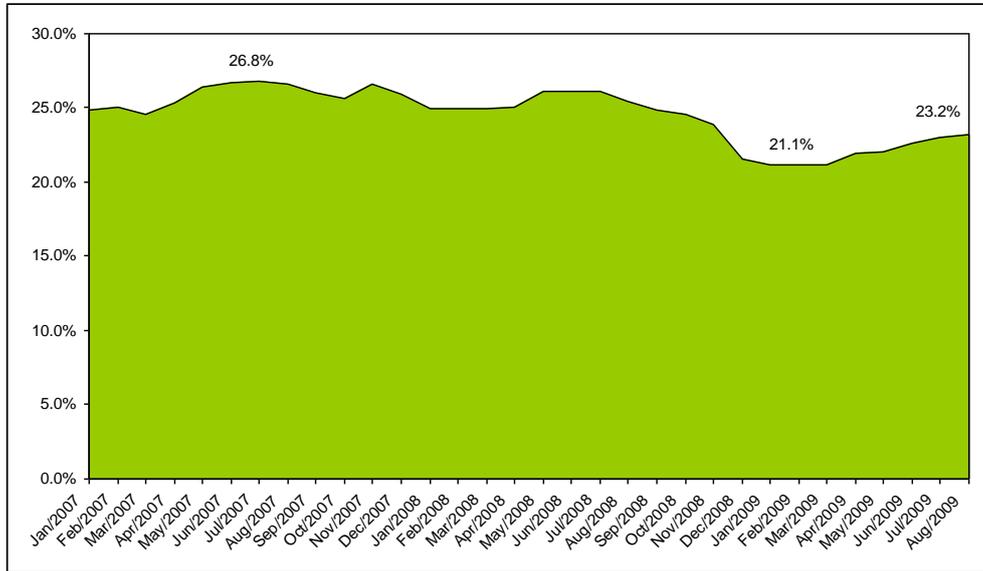
In the Environment of Free Procurement - ACL there is a free negotiation between generator agents, commercial agents, free consumers, energy importers and exporters. The main feature of this environment is the freedom to set purchase and sales volumes of energy and their respective prices, with all the transactions being established in bilateral contracts.

What is expected of the captive market of distributors is an insignificant interference from the crisis, due to the fact that energy is contracted with support of long-term contracts. Moreover, the electricity sector regulatory framework is sound.

However, the free market will have deeper implications, since most of the large consumers are companies in the electricity intensive sector of metal and steel, segments which have suffered significant impact since the beginning of the period of crisis.

Indeed, like other sectors of the Brazilian economy, the moment proved to be a deadlock in the energy trade, but nonetheless has caused a drop in prices for 2009. The price of R\$200.00/MW in June 2008 dropped to R\$130.00/MW in December. Apparently, the level of supply has been adjusting in recent months and is now between R\$140 and R\$145.00/MW.

From Figure 9 it is possible to identify that the participation of the ACL in the market fell from 26% in 2007 to 21% on March 2009 but has gradually increased since May.

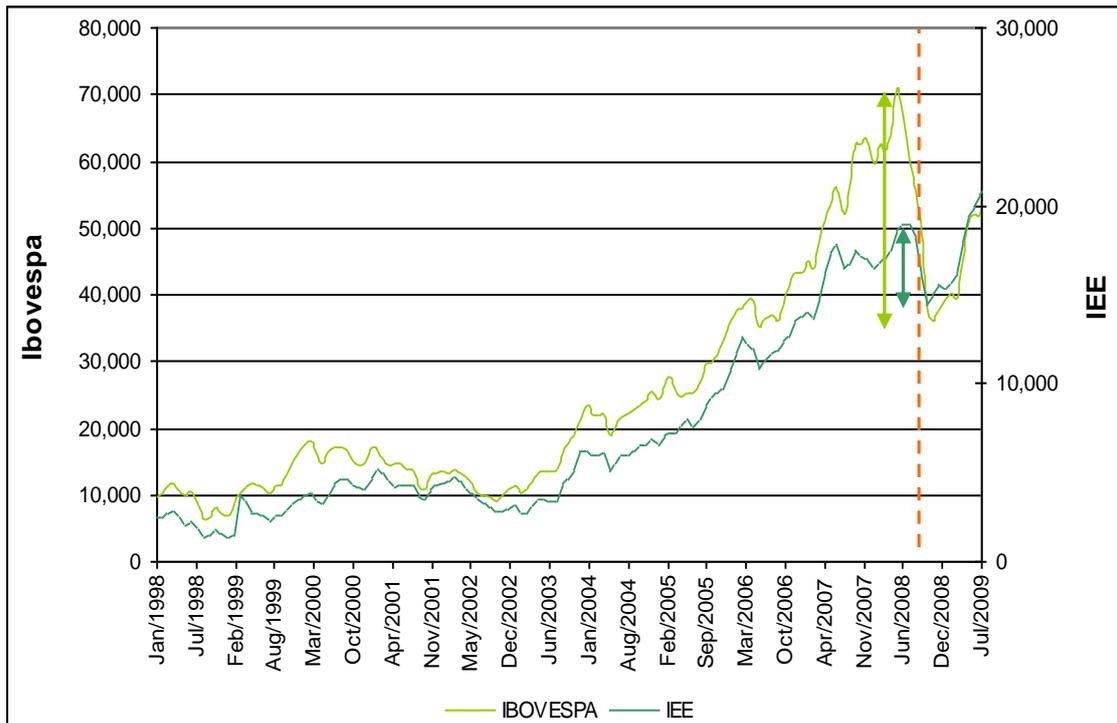


**Figure 9** – Participation of the ACL in the Market (Source: CCEE).

In relation to the stock market, the roles of the electricity sector showed the best performance of the Bovespa in 2008 and are still rising in 2009, as can be seen in Figure 10. This chart shows that the Energy Index - IEE<sup>18</sup> suffers less oscillation than the Bovespa index from September 2008.

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<sup>18</sup> The Energy Index (IEE) was launched in August 1996 with the aim of measuring the performance of the electricity sector. It constitutes a tool for assessing the performance of portfolios that specialize in this sector, including generators, transmitters, distributors and commercialization companies.



**Figure 10** – Average Monthly Prices of IEE and the IBovespa (Source: Bovespa).

A statistical study done by Pinto Jr. et. al. (2004) on the relationship between the volatility of the Brazil Risk and instability of Energy Index - IEE found an inverse relationship between the time series for the periods from 1999 to 2000 and from 2003 to 2004. This shows that high variations around the IEE are accompanied by reduced volatility of risk.

Indeed, electricity companies are strategically used as security stocks; they are paying good dividends and have a fixed income. The transmission companies are lower risk; it does not depend on market and have the Allowed Annual Revenue. The generation companies are under contracts type "take or pay", that is, buyers are required to pay the contracted energy, even if not used. Though distribution companies also represent a low risk, they are more susceptible to the effects of the crisis, it immediately felt the effects of the economic downturn, caused by industrial production.

## 6 – Conclusions

In assessing the counter-cyclical measures that affected the economy, we see the beneficial effect for the resumption of economic growth. Combined with an independent central bank and efficient financial system regulation, the impact of the current global crisis in Brazil was very mild compared with developed countries. The moment is to continue prioritizing the provision of credit for the projects of infrastructure, which has been done by the government.

In fact, Brazil is anchored on solid economic foundations, which allowed the rapid return of investment attraction. The strength of domestic consumption contributed much to the country to withstand acute moment of crisis. For international investors, there is consensus that Brazil has the potential for investment because it has the 7th consumer market in the world and presents the prospect of advancement, since only 35% of the population participates in the so-called "consumer society".

Not coincidentally, the business plan that received the largest investment in the first quarter of 2009 in the world was in the Brazilian electric power sector. This project was the Santo Antônio Energia, which collected US \$ 6.2 billion to build hydropower plant in Santo Antônio, by the Madeira River.

Another factor that contributed to confront the crisis concerns the choice of trade diversification that allows the repositioning of Brazil in the world with sovereignty. While countries like Mexico limit their foreign trade with the United States, Brazil has diversified its trading partners.

Particularly in the Brazilian Electricity Sector, the current model provides a solid institutional environment, characterized by institutions, legal framework and administrative quality, which are essential for competitiveness, growth and for attracting investment. In fact, with the slowdown in industrial activity, the crisis created an oversupply of electricity, which from a point of view of planning guarantees greater flexibility and comfort for the future supply.

Therefore, it would be highly recommended that the government facilitating new wind energy projects which are not yet competitive with energy from hydropower plants. We recommend the use of multilateral institutions loans with sovereign rate as a means of subsidizing such enterprises. For example, IDB can provide financing (in the form of equity investments, loans, guarantees, and other instruments) and advisory services to private enterprises.

## **7 – References**

**Bresser Pereira**, Luiz Carlos (1995) – A Reforma do Aparelho do Estado e a Constituição Brasileira: Escola Nacional de Administração Pública – ENAP.

**Gomes**, Antônio Claret S.; Abarca, Carlos David G.; Faria Elíada Antonieta S. T.; Fernandes, Heloísa Helena de O. (2002) – BNDES 50 Anos – Histórias Setoriais: O Setor Elétrico. Estudos Setoriais do Banco Nacional de Desenvolvimento Econômico e Social – BNDES.

**Landi**, Mônica (2006) – Energia Elétrica e Políticas Públicas: A Experiência do Setor Elétrico Brasileiro no Período de 1934 a 2005. Tese de Doutorado, Programa Interunidades de Pós-Graduação em Energia – PIPGE, Universidade São Paulo, 219 p. São Paulo – SP.

**Ferreira**, Carlos Kawall Leal (2000) – Privatização do Setor Elétrico no Brasil. In A Privatização no Brasil: o caso dos serviços de utilidade pública, Armando Castelar Pinheiro; Kiichiro Fukasaku (orgs.). Rio de Janeiro: BNDES, 2000. Disponível em <<http://www.bndes.gov.br/conhecimento/ocde/ocde06.pdf>>. Acesso em 12 mai. 2009.

**Empresa de Pesquisa Energética**, Brasil (2008) - Balanço Energético Nacional 2008: Ano base 2007. Rio de Janeiro: EPE, 2008. 244 p.

**Empresa de Pesquisa Energética**, Brasil (2005) – Mercado de Energia Elétrica 2006-2015. Rio de Janeiro: EPE, 2005. 380 p.

**International Monetary Fund** (2009) – World Economic Outlook: Crisis and Recovery, April 2009.

**International Monetary Fund** (2009) – Initial Lessons of the Crisis. February 6, 2009. Disponível em <<http://www.imf.org/external/np/exr/key/finstab.htm>>.

**International Energy Agency** - IEA(2009) – The Impact of the Financial and Economic Crisis on Global Energy Investment. Disponível em <<http://www.indiaenvironmentportal.org.in/content/the-impact-financial-and-economic-crisis-global-energy-investment>> em 28/05/2009.

**Greenspan**, Alan (2007) – The Age of Turbulence, Adventures in a New World. The Penguin Press. New York. 2007.

**Banco Central do Brasil** (2009) – Relatório de Inflação, março 2009. Volume 11, Número 1.

**Blinder**, Alan S & **Maccini**, Louis J, (1991). "The Resurgence of Inventory Research: What Have We Learned?," Journal of Economic Surveys, Blackwell Publishing, vol. 5(4), pages 291-328.

**Pinto Jr.**, Helder Queiroz; **Iotty**, Mariana; **Roppa**, Bruna (2004) – Volatilidade das Ações das Empresas Elétricas no Brasil: Uma Análise Comparativa Entre IEE e Risco Brasil no Período 1999-2004. In: X Congresso Brasileiro de Energia.

**Instituto Brasileiro de Geografia e Estatística** – IBGE (2009) - Indicadores IBGE: Contas Nacionais Trimestrais. Indicadores de Volume e Valores Correntes janeiro/março 2009. Disponível em: <[ftp://ftp.ibge.gov.br/Contas\\_Nacionais/Contas\\_Nacionais\\_Trimestrais/Fasciculo\\_Indicadores\\_IBGE/](ftp://ftp.ibge.gov.br/Contas_Nacionais/Contas_Nacionais_Trimestrais/Fasciculo_Indicadores_IBGE/)>

**Centro Brasileiro de Infra Estrutura** – CBIE (2008) – Informativo Energia em Foco nº 68.