



## RECENT EVOLUTION OF BRAZIL'S ECONOMY, THE MACROECONOMIC OUTLOOK AND ELECTRICITY SECTOR DYNAMICS<sup>1</sup>

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### Abstract

With reference to a very favorable macroeconomic context of the Brazilian economy in 2007, the objective of this paper is to analyze the impacts on consumption of electricity and the expansion of installed generating capacity, is seeking a position signal on the real prospects of balance or imbalance between supply and demand of electric energy for the coming years.

**Key Words:** brazilian economy; electricity sector; scenarios;

**JEL:** L1; L2; Q43

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<sup>1</sup> Paper presented at the International Seminar "Dos Modelos à Realidade dos Mercados de Electricidade: União Européia e Brasil". Faculdade de Economia, Universidade do Porto. Porto, 28-29 January 2008.

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## INTRODUCTION

Developments in Brazil's economy over the past three years include elements that hold out the promise of a more favorable and stable future. Now that the stop-go tendency has been overcome and an institutional apparatus firmly established with the ability to control inflation, increase total wages and credit, and balance foreign accounts and public sector solvency (with inflation targets, floating exchange rate and primary surplus), there are now windows of opportunity favoring higher growth rates.

This situation thus affords the encouraging prospect of building a process of more sustainable economic growth in Brazil in coming years, which will have very beneficial impacts on the electricity sector, by virtue of (i) increased demand associated with greater growth in Gross Domestic Product (GDP) and (ii) improved financing conditions for expanding installed capacity.

This paper examines the dynamics of Brazil's economy in terms of macroeconomic fundamentals, the analytical focus being on impacts on electricity supply and demand in Brazil. The paper is divided into three parts. The first considers Brazil's economic performance over the past four years on the basis of macroeconomic indicators. The second analyzes factors that condition electricity demand in Brazil. The third offers an analysis of prospects for the electricity sector in Brazil in a scenario of economic growth.

## I – BRAZIL'S MACROECONOMIC EVOLUTION

Brazil has been growing steadily, albeit at modest rates, for approximately five consecutive years. Even though this may not be considered a long period of expansion, for analytical purposes, it can – given the track record over the past two decades – be considered a fairly long cycle of GDP expansion. In comparative terms, it surpasses the 1984-1987 growth period and the brief 1993-1995 period of the *Plano Real*. The current growth cycle ranks second only to the phase known as the "Brazilian Miracle", which extended from 1968-1973.

The most salient fact about these five years of uninterrupted growth is the break with the stop-go pattern that had predominated since the start of the 1980s, reflecting the need for corrections to address problems stemming from Brazil's macroeconomic imbalances. Besides qualifying as a long period of growth by Brazilian standards, the present cycle has another characteristic: it combines investment and consumption. Steady growth combined with more optimistic future scenarios has encouraged companies to invest in expanding industrial capacity. Increased income, employment, total wages and credit have created conditions

favorable to consumption, which has made the domestic market a significant variable in underpinning GDP growth.

Specifically in 2007, empirical evidence shows that the pattern of economic growth featured domestic demand expanding more than GDP. As a counterpart to this behavior, the net exports component of aggregate demand and the current account balance both declined as a result of increased imports, particularly to support expansion of installed capacity. The declining current account balance has been mitigated by the fact that Brazilian export prices have increased more than import prices, but it may show more clearly in years to come if improved terms of trade do not last. The foreign financing is available for a current account imbalance, and the foreign sector is performing exceptionally well (current account surplus, robust international reserves, net foreign debt tending to zero and the probability that Brazil will be awarded "investment grade" status in 2008), all of which should enable this pattern to endure in Brazil's economy for several years. Thus, the imbalance may not adversely affect how the economic system functions over the next few years, but increasing net foreign liabilities may lead to a reintroduction of the "balance-of-payments constraint" on Brazil's economy (*Grupo de Conjuntura*, IE/UFRJ, 2007). That domestic demand (consumption plus investment) is growing more than GDP can be seen from Table 1 and Graph 1.

TABLE 1

**Domestic Demand and GDP Growth Rates, 2004-2007 (%)**

	Domestic Demand (a)	Net Exports (b)	GDP (c) = (a) + (b)	Domestic Demand Growth Rate
2004	5,13	0,55	5,68	5,28
2005	2,49	0,49	2,98	2,59
2006	5,06	-1,38	3,68	5,25
2007 <sup>1</sup>	5,94	-1,18	4,76	6,14

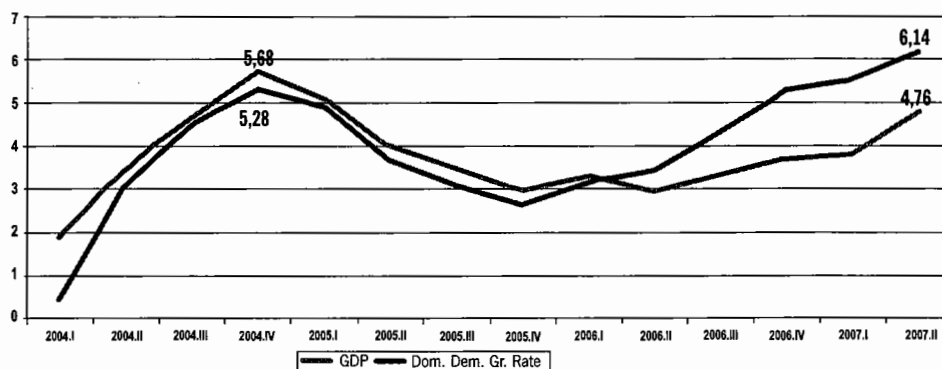
Source: IBGE. Prepared by *Grupo de Conjuntura*, IE/UFRJ, 2007.

(1) Four-quarter accumulated to end 2<sup>nd</sup> quarter 2007.

Graph 2 shows evidence of how, more recently, demand and GDP have fallen out of step, accompanying sharp differences between import and export growth rates. Part of the additional domestic demand is thus being met by increased imports (as compared to exports) and not by increased domestic production. Import and export performance thus provides an indirect indication of how domestic demand is evolving with regard to GDP. If this pattern of growth holds, it becomes a workable hypothesis that the difference between import and export growth in GDP will remain high in coming years, indicating that the mismatch between domestic demand and GDP will remain glaringly large.

GRAPH 1

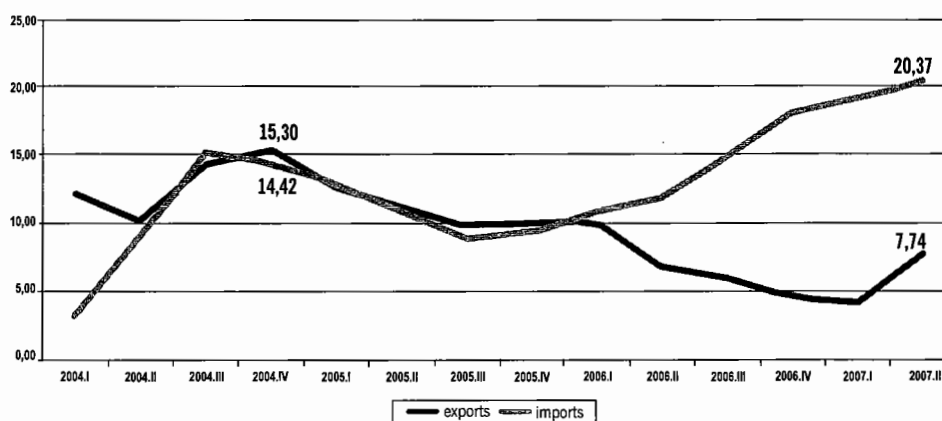
**GDP and Domestic Demand Growth Rates, 2004-2007**  
(Four-quarter Accumulated - %)



Source: IBGE, Prepared by Grupo de Conjuntura, IE/UFRJ, 2007.

GRAPH 2

**Goods and Service Import and Export Growth Rates, 2004 -2007**  
(Four-quarter accumulated - %)



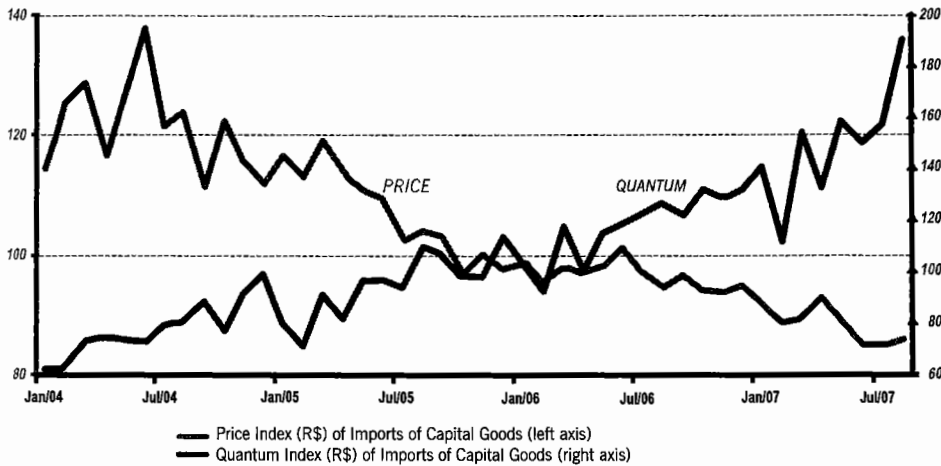
Source: IBGE, Prepared by Grupo de Conjuntura, IE/UFRJ, 2007.

Meanwhile, conditions in the foreign sector have contributed to a process of accelerating investment. As Brazil's currency has gained in value against the dollar, the price of imported machinery has declined in *reais*, encouraging foreign purchases, as can be seen in Graph 3. In a context of strongly expanding domestic demand, exchange appreciation of 9% (in 12 months) has been a considerable spur to the volume of capital goods imports, which are growing at 30% a year. The increasing importance of imported machinery in the apparent capital goods

consumption has also contributed to modifying the structure of fixed capital investment in Brazil's economy (*Grupo de Conjuntura*, IE/UFRJ, 2007).

GRAPH 3

Capital Goods Imports – Prices vs. Quantum. 2004-2007  
(Index at Jan 2002 = 100)



Source: IBGE, Prepared by *Grupo de Conjuntura*, IE/UFRJ, 2007.

The strategic variable Gross Fixed Capital Formation (GFCF) specifically is being stimulated by a combination of two factors:

- i) declining domestic and foreign capital goods prices; and
- ii) greater confidence on the part of the private sector, which is able to plan its investments and stocks as desired.

These stimuli are reflected in the rapidly expanding supply of machinery and equipment designed to meet domestic demand, which is both growing and diversified.

Note that this shift in the pattern of economic growth in Brazil – with GFCF a strong presence – is very beneficial in making for balanced growth free of stop-go intervals. In other words, in order to sustain growth of the order of 6% in household consumption without jeopardizing price stability, it is important for investment to grow at higher rates so as to narrow the gap between growth in supply and demand. At present, this process is being influenced by exchange appreciation, which favors machinery imports, thus relieving domestic pressure on Brazilian machinery manufacturers, with beneficial effects on inflation. It is this

set of factors that is guaranteeing a large part of the sustained investment growth, signaling that Brazil's economy has been relatively successful in taking advantage of the recent exchange rate trend and has demonstrated its ability to adapt to the new exchange rate levels (*Grupo de Conjuntura*, IE/UFRJ, 2007).

The present pattern of growth in Brazil's economy, based on domestic demand expanding more than GDP, carries with it the possibility of the balance of payments current account becoming severely unbalanced. A current account that deteriorates year after year cannot be sustained for many years.

The conspicuous (and growing) difference between the volumes of imports and exports is cause for concern. It suggests that the exchange appreciation of the past few years, combined with lingering factors associated with "Brazil cost", is considerably impairing Brazil's economic competitiveness. However, the adverse impact of these factors (particularly the stronger *real*) on industrial growth has been far less than was imagined.

The fact is that the extremely favorable behavior of domestic demand is paving the way for industry to perform well, in spite of strongly expanding imports and negligible growth in the quantum of manufactured exports. In addition, in the specific case of sectors of industry connected with commodity production (such as mining and basic metallurgy), high international prices have favored their performance. Thanks to these factors – domestic demand and commodity prices – industry is growing at a good rate, despite the behavior of export and import volumes sending negative signals as regards its foreign competitiveness.

This pattern of growth has been damped somewhat by improved export prices and foreign terms of trade. In the event that prices turn "neutral", the corresponding worsening in the current account as a yearly % of GDP will be accentuated and unsustainable in the long run.

The present disparity between domestic demand and GDP cannot be maintained, and thus the tendency is for the exchange rate to decline. In the most appropriate scenario, where this exchange devaluation is gradual, its adverse effect on inflation, interest rates and domestic demand will not be very significant. Further in the future, the economy would then be in a position to resume growth, and to do so with a better balance between domestic demand/GDP and imports/exports.

How GDP will behave in the period of adjustment between domestic demand and GDP expansion rates is an open question, and will depend crucially on the intensity of exchange devaluation in coming years and its effects on inflation and interest rates. One basic determinant of how this adjustment will come about is certainly the foreign scenario. If, as expected, there is a gradual cooling of the world economy, pulled one way by the USA and the other by the performances of the Chinese and Indian economies, then commodity price levels will tend to remain high, favoring Brazil's economy. An adverse scenario would feature a strong

slowing of the world economy and a fall in world commodity prices, directly jeopardizing the Brazilian economy (*Grupo de Conjuntura*, IE/UFRJ, 2007).

Lastly, one key variable for Brazil to enjoy sustained growth will be how investment rates behave in coming years. The challenge will be to keep investment growth as vigorous as at present, so as to increase potential output and prevent supply constraints from frustrating growth expectations. In this regard, one crucial point for sustained growth will be the behavior of investment in infrastructure, particularly in electric power.

## II – ENERGY DEMAND IN BRAZIL

In order to examine the prospects and dynamics of demand growth in Brazil's electricity sector in coming years, attention must focus on the main macroeconomic variables. It is thus assumed here, for methodological purposes, that a strong correlation exists between the macroeconomic dynamics and demand for electric power.

A good example of this correlation can be seen between growth in residential demand for electric power, where rates have been very high, and families' increased purchasing power and indebtedness. Figures available from Brazil's national statistics office (IBGE) have indicated total earnings are increasing. Stable prices have enabled an increase in real purchasing power. Meanwhile, the trade union statistics department (DIEESE, 2007) reports that in the past two years recorded wage negotiations yielded increases in excess of inflation. Another variable that has encouraged the expansion in family consumption capacity has been freer credit. The volume of financing for – particularly durable – goods purchases has been rising since 2000. In the same direction, inflation is under control, real interest rates are falling and employment is both growing and more stable, leading major chain stores, banks and finance houses to extend timeframes progressively for goods purchases.

Taken together, these alterations and trends signal clearly that the residential and commercial sectors will play an increasingly important role as explanatory variables as regards mounting demand for electric power. Castro and Bueno (2006) see social policies (the school attendance allowance, "light for all" etc.) and economic stability as modifying the structure and distribution of income, incorporating less-favored sectors of Brazilian society where there is strong repressed demand for consumer durables ("white goods"), to say nothing of demand from the lower middle class. Thus, as GDP grows and the behavioral parameters of the macroeconomic variables most directly affecting this vast contingent of consumer families hold steady, the impact of residential demand for electric power will be – and will remain – high, meaning that new historical series that are discontinuous

with past patterns of growth will take shape. As regards commercial consumption, the higher growth rates point to a change in the pattern of economic development, as already observed in more developed countries.

In this scenario, electricity market behavior is being favorably influenced by these economic factors. These factors' effects on the market vary in intensity by market segment and region of Brazil. The energy research enterprise, EPE (2007), reports that the electric power supply market, comprising free and captive consumers served through Brazil's electric power grid, expanded at 5.3% over the 12 months to November 2007, with the residential segment expanding by around 5.9%. This result corroborates the arguments and analyses expressed above and reflects the increased consumption of electrical and electronic household appliances in residences and the increasing number of consumers served. The increase in commercial sector electricity consumption (6.7% in the past 12 months from November) is regarded as related to firms' modernizing by way of machinery and equipment purchases, and computerization and air-conditioning of existing facilities.

In the industrial sector, which accounts for 45.7% of total use, consumption rose 4.8% over the 12 months to November. Although industrial growth over the period was lower than the overall mean, the sector is recovering steadily. The process of more sustainable growth is stimulating increasing electric power consumption, particularly in the capital goods, durables and some electro-intensive sectors.

Another factor that is also contributing to the increase in electric power consumption is new residential consumer connections. EPE (2007) shows that, in the 12 months to November 2007, nearly 1.8 million new consumers were brought into the system, particularly as beneficiaries of the Light For All (*Luz para Todos*) Program, which since 2004 has been responsible for connecting more than 440,000 new low-income residential consumers per year, and thus accounts for more than 25% of new connections.

In this regard, the expectation in Brazil is for the growth in demand for electric power to remain high over the next few years. The power supply expansion plans for the next ten years and to 2030 were drawn up by EPE on the basis of 4.5% annual growth in electricity demand.

Electric power supply planning and monitoring instruments are becoming increasingly necessary to meet the challenge of striking the most appropriate energy balance, and the dynamics of expanding demand introduce a variable that will have an impact and the potential to unbalance in the three-year period 2009-2011.



### III – ELECTRICITY SECTOR CHALLENGES IN THE SCENARIO OF ECONOMIC GROWTH

While increased energy consumption is indicative of economic growth, higher demand signals an urgent need for guaranteed supply in coming years.

EPE studies include the ten-year electric power expansion plan (PDEE 2007-2016), which projects energy supply growth for the next 10 years, and the 2030 national energy plan (PNE 2030), a long-term planning instrument for Brazil's energy sector, which points to sector growth trends and alternative means of ensuring energy supply growth. The new electric power generation project auctions (*Novos Empreendimentos de Geração de Energia Elétrica*) have been segmenting into a fundamental mechanism for ensuring that electric power supply expands – and consequently that demand is met – in Brazil. Three public tenders for new projects have been held so far – one in 2005 and another two in 2006 – which guaranteed the market would be supplied for 2008 and 2009, and needs partly met for 2010 and 2011. In 2007, two more auctions were held for “new” power to supply the market in 2010 – the portion not covered by previous auctions – and 2012, by power supply from 106 new plants, totaling 16,022 MW, which use hydro and thermal sources to generate power, in addition to one more auction for the Santo Antônio facility on the Madeira River, with a generating capacity of 3,150 MW, to come into operation probably in 2012.

The results achieved by the auctions of “new” energy - i.e. supply practically guaranteed for the coming three years, and a good part of the market met for 2011 and, when the first two turbines come on line at Santo Antônio, for 2012 onwards) - are concrete evidence that the regulatory framework put in place by the Lula Government starting in 2003 is firmly established. The fact that tariff moderation has been achieved also reinforces the view that the new model for the Brazilian electricity system has been consolidated. As observed in the periodic reviews of electric power distributor tariffs by the regulatory agency (ANEEL), adjustments are smaller than in previous years, and in some cases even show reductions in the price of electricity supplied to captive consumers.

A firmly established, stable regulatory framework is important to reduce regulatory risk in Brazil's electricity sector, and it creates a favorable scenario for attracting new private investment in Brazil's electricity sector. Liquidity conditions in the world economy have been reflected in improvements in Brazil's economic indicators over the past few years. For example a lower base interest (SELIC) rate and the vertiginous drop in country risk, which measures market trust in investment in Brazil, ensure a scenario favorable to investment.

EPE (2006) rates Brazil's hydroelectric potential at a total volume of 261 GW. Of that total, 30% is already in operation or under development. The remaining 70% is potential not yet exploited: 38% is still being inventoried, while the

other 32% is just estimated, but with no related utilization studies. That is to say Brazil has 182.7 GW of unexploited potential hydro power.

Construction of large hydroelectric plants (HEPs) in the Amazon has been at a standstill for nearly 30 years, but when the growth acceleration program (PAC) was launched at the start of the year signs were given that this kind of project would resume. The first facility to come off the drawing board was Estreito, on the Tocantins River, close to the Pará State border. With 1,087 MW of installed power, this HEP should come on line in 2010. The Jirau plant, rated at 3,300 MW, is scheduled to come to auction in 2008 or 2009. Meanwhile, the Belo Monte HEP, on the Xingu River, with power rated at 11,181 MW, is currently at the preliminary licensing stage with the national environment agency (IBAMA), although the government intends to take it to auction by the end of 2010. This series of major projects is to continue with the Marabá HEP on the Tocantins River, which is also at the preliminary licensing stage, and the São Luiz HEP on the Tapajós River, both in Pará State. Taken together with smaller plants that are the subject of feasibility studies or inventory, the PAC has pointed to the exploitation of a possible additional 58,700 MW in northern Brazil.

These projects, which are considered structural because of their magnitude, are fundamental to ensuring energy supply over the coming decade, according to estimates drawn up by the EPE, as part of the ten-year electric energy expansion plan (*Plano Decenal de Expansão de Energia Elétrica – PDEE 2007-2016*).

The PDEE 2007-2016 forecasts that in the upper-curve market scenario (with GDP growing at a mean 4.9%) an additional 50,682 MW would be needed in the next ten years, 31,780 MW of it from hydroelectric plants and 18,902 MW from thermoelectric plants. In the lower-curve market scenario (GDP mean growth at 4.2%), it estimates that installed capacity will need to expand to the level of 45,082 MW. Of that total, 13,302 MW would be thermoelectric while hydroelectric plants would account for the same amount as in the upper-curve scenario. The PDEE 2007-2016 regards the upper-curve and lower-curve scenarios as requiring the same capacity in HEPs, because the array of HEPs required for the lower-curve situation practically exhausts the viable HEP potential that can be developed to a ten-year horizon.

The PDEE estimates investment needs as of the order of R\$ 167.5 billion, of which R\$ 133.6 billion are for generation and R\$ 33.9 billion for transmission in order to guarantee that forecast demand will be met over the ten-year period. These figures underline the importance of firmly establishing the pattern of financing and the regulatory framework of Brazil's electricity system (SEB), because these two factors create an attractive scenario for private investors, who can play an important part in meeting this estimated investment target.

On a longer-term view, the PNE 2030 – taking the mean GDP growth of 4.1% as its frame of reference for economic growth over the period 2005-2030 –

estimates that in 2030 Brazil's installed capacity will be 223.4 GW, an increase of 132.7 GW over the base-year of 2005. Of the total added, 88.2 GW relate to power from hydroelectric plants, which will account for 156.3 GW of the total offered in 2030. For the period 2005-2015, installed capacity from HEPs is expected to grow by 30.9 GW while for the period 2015-2030 the increase should be 57.3 GW.

On the basis of the scenarios set out in the plans prepared by the EPE, Brazil's federal government also took measures to encourage the investment necessary for energy supply to grow. The federal government's growth acceleration program (*Programa de Aceleração do Crescimento, PAC*), which was brought in to stimulate economic growth in Brazil, provides for investment in infrastructure, especially in the electricity sector to guarantee the power supply necessary for expected economic growth in coming years.

Meanwhile, the national economic and social development bank, BNDES (Pimentel and Borça, 2007), decided to conduct a mapping of infrastructure investment prospects in Brazil for the period 2008 to 2011. A study was made of Brazil's five major infrastructure sectors, which – according to the investment bank – accounted for 70% of investment in infrastructure in 2006. They are electric power, sanitation, communications, railways, and ports.

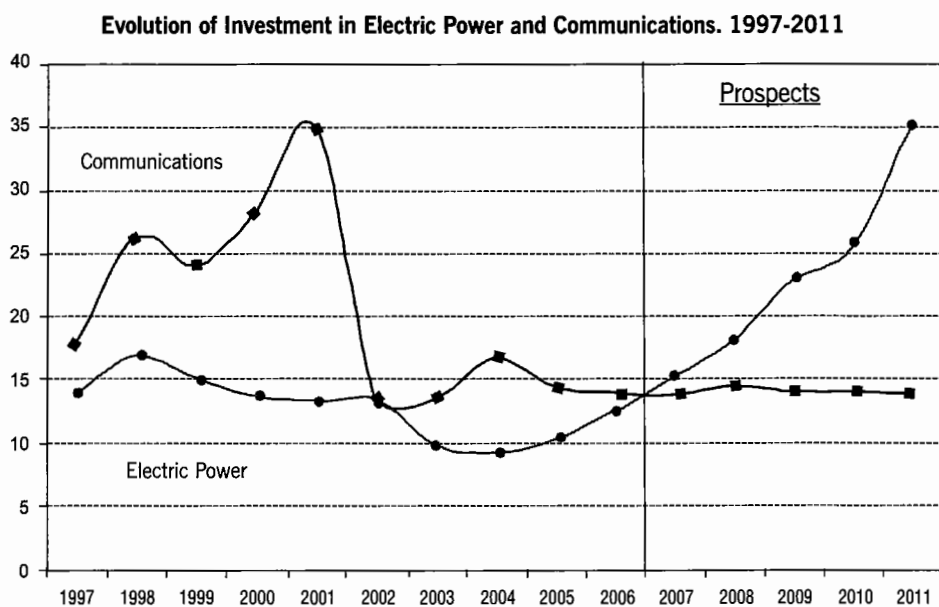
Pimentel and Borça (2007) stress that, characteristically, investments in infrastructure are highly concentrated in time, accompanying the various cycles of expansion in the major sectors. Thus, over the past 10 years, the communications sector has occupied the leading position, as can be seen in Graph 4. This scenario, however, will change, as forecast by the BNDES mapping of investments expected for the next four years.

According to the survey, investments forecast for the period 2008 to 2011 total R\$ 231.7 billion, representing a growth of 13.2% p.a. more than in the period 2003-2006, when investments totaled R\$ 124.6 billion, as shown in Table 2. It can thus be seen that investment in the five infrastructure segments studied by the BNDES is forecast to increase R\$ 107.1 billion over the next 4 years.

Of the five segments, the study identifies the electric power sector as accounting for the greatest volume of investments: R\$ 101.0 billion or 43.6% of the total (see Table 3). Also, investment is expected to grow at 19.8% p.a. compared with the four-year period 2003-2006, when investments totaled R\$ 40.9 billion or 32.8% of the total, representing the second largest volume of investment in the period, second only to Communications. Note also that the electric power segment makes the largest contribution to increasing investment in infrastructure. Of the total additional volume of approximately R\$ 107.1 billion forecast for the four-year period 2008-2011, electric power accounts for 56.15%, or R\$ 60.1 billion.

Major generation projects either already under contract or planned – as is the case of the Rio Madeira Complex – are largely responsible for the amount

GRAPH 4



Source: PDI-BNDES, *Prospecção do Investimento*, APE/BNDES.

TABLE 2

**Growth in Mapped Investment in Infrastructure: 2008-2011 / 2003-2006**

Segment	Investments (in R\$ billion)		Growth Rate (% p.a.)	Contribution to increasing investment	
	Invested 2003-2006	Forecast* 2008-2011		R\$ billion	(%)
Infrastructure	124.6	231.7	13.2	107.1	100.00
Electric Power	40.9	101.0	19.8	60.1	56.12
Communications	58.3	56.0	-0.8	-2.3	-2.15
Sanitation	13.4	48.0	29.0	34.6	32.31
Railways	9.1	19.9	16.9	10.8	10.08
Ports	2.9	6.8	18.7	3.9	3.64

Source: PDI-BNDES, *Prospecção do Investimento*, APE/BNDES.

Obs. (\*) at 2006 prices.

forecast. The BNDES mapping shows expected investment in generation of the order of R\$ 58 billion, corresponding to 57.4% of the total forecast. The survey also forecasts investments of R\$ 26 billion for distribution and R\$ 17 billion for transmission, as in Table 4.

Financing is an important variable in this favorable outlook for the electricity sector. It is important to note that the pattern of financing has consolidated as a

TABLE 3

**Mapped Investments in Infrastructure  
2008-2011**

Segment	Investments 2008-2011 (in R\$ billion)	%
Infrastructure	231.7	100.0
Electric Power	101.0	43.6
Communications	56.0	24.2
Sanitation	48.0	20.7
Railways	19.9	8.6
Ports	6.8	2.9

Source: PDI-BNDES, *Prospecção do Investimento*, APE/BNDES.

TABLE 4

**Investment forecast in Brazil's electricity sector, by segment,  
for the period 2008-2011**

Segment	Expected Investment (in R\$ billion)	(%)
Generation	58.0	57.43
Distribution	26.0	25.74
Transmission	17.0	16.83
<b>Total</b>	<b>101.0</b>	<b>100.00</b>

Source: BNDES, prepared by GESEL-IE-UFRJ.

direct consequence of both electricity sector regulatory stability and the reestablishment of sector planning. This has underpinned the introduction of new financing arrangements for Brazil's electricity sector, for instance, BNDES' extending special lines of financing for transmission projects, or structured lines of financing formatted as project finance<sup>2</sup> for generation and transmission projects. These financing instruments are very attractive to Brazilian or other private companies who are interested in investing in Brazil's electricity sector and becoming leading players in the nation's electricity sector.

In addition to these specific lines of financing, there is a growing tendency on the part of companies participating in the electricity sector to seek financing

<sup>2</sup> *Project Finance*: in this model of financing, the firms or consortium of firms responsible for building a given project must set up a special purpose entity (*Sociedade de Propósito Específico*, SPE), which will be solely and directly responsible for the project in question. In this way, project cash flow is used as collateral for the financing granted.

through the stock market, either by issuing debentures, shares or through credit receivable funds (FIDCs). Tables 5 and 6 show that, from 2003 to 2007, the electricity sector raised a total of R\$ 19.7 billion through debenture issues, which is approximately 11.4% of all investment attracted in this way by stock markets in Brazil. Also from 2003 to 2007, the electricity sector raised R\$ 6.5 billion from receivable funds, which represented 17.2% of the total issued by the market.

TABLE 5

**Electricity Sector Participation in Debentures issues - 2003 to 2007  
(in R\$ billion and %)**

Year	Operations			Total Issued in R\$ billion)		
	Electricity Sector	Total	%	Electricity Sector	Total	%
2003	4	17	23.5%	2.48	5.28	46.9%
2004	11	38	28.9%	2.38	9.61	24.8%
2005	12	45	26.7%	4.82	41.54	11.6%
2006	12	47	25.5%	5.43	69.46	7.8%
2007	12	43	27.9%	4.60	46.53	9.9%
<b>Total</b>	<b>51</b>	<b>190</b>	<b>26.8%</b>	<b>19.72</b>	<b>172.43</b>	<b>11.4%</b>

Source: CVM, Prepared by GESEL-IE-UFRJ.

TABLE 6

**Electricity Sector Participation in receivables fund operations - 2003 to 2007  
(in R\$ billion and %)**

Year	Issues Recorded			Total Issued in R\$ billion)		
	Electricity Sector	Total	%	Electricity Sector	Total	%
2003	0	11	0.0%	0.00	1.54	0.0%
2004	3	32	9.4%	1.09	5.13	21.2%
2005	4	46	8.7%	1.76	8.58	20.5%
2006	5	63	7.9%	1.88	12.78	14.7%
2007	5	65	7.7%	1.82	9.96	18.2%
<b>Total</b>	<b>17</b>	<b>217</b>	<b>7.8%</b>	<b>6.54</b>	<b>37.99</b>	<b>17.2%</b>

Source: CVM, Prepared by GESEL-IE-UFRJ.

At present, the prospects are that the sector will expand, with increasing participation by thermoelectric plants and to a lesser degree, wind farms, small hydroelectric plants and biomass. The main characteristic of these projects is that they are built to much shorter maturity horizons than hydroelectric plants and their investment needs are smaller.

Given that in the short term technical, financial and regulatory conditions exist for expanding supply capacity by way of thermoelectric, diesel-fired, and coal-fuelled plants, mismatches between electric power supply and demand are likely to diminish in Brazil. The limits will be the availability of energy inputs, such as – at the moment – natural gas, environmental legislation (which raises the direct costs of new hydroelectric projects by incorporating environmental responsibility) and the expense of fuel where non-renewable sources are to be used to produce so-called dirty power (Castro and Franscescutti, 2007).

In that regard, given the solidity of the regulatory framework which, in the specific case of auctions, ensures mechanisms for expanding short-term supply to any energy source, an electric power supply crisis is highly unlikely. Brazil's energy base mix yields a diversified matrix, thus ensuring the country a favored position in terms of reducing the hydrological risk entailed by its electricity system, and at the same time opening windows of opportunity for new investments in the sector with a view to more sustainable economic development.

## CONCLUSION

By way of conclusion, since 2004, considerable advances can be observed in terms of sounder macroeconomic fundamentals and stability in the institutional environment of Brazil's economy. The main macroeconomic variables, such as monetary stabilization, steadily falling domestic interest rates, positive indications of external solvency, improvements in payment capacity indicators, and a declining ratio of net government debt to GDP clearly indicate that Brazil's economy has gained firmer, more solid foundations than in years past, especially as compared with the 1990s. These results enable the economic authorities to move ahead in implementing a program of incentives for GDP expansion, which concretely means aligning macroeconomic policy towards achieving sounder and more sustainable growth for Brazil. On the basis of this macroeconomic scenario, expectations are for an increase in demand for electric power associated with greater economic growth. In this regard, increasing income and employment, falling interest rates (including those for personal credit), elongation of financing timeframes, and other factors have all generated a knock-on reaction in the economy that is reflected in electric power consumption. It is becoming increasingly necessary to use instruments for planning and monitoring electric power supply, in view of the challenge of achieving the optimum energy balance, where the dynamics of expanding demand will constitute a high-impact variable and possible a source of disruption.

The major challenge posed by rising electric power demand now resides in expanding installed generating capacity. The difficulties of expanding supply

lie in the environmental issue (Castro, 2007), especially as regards supply from hydroelectric plants in new energy auctions. The delays in hydrographic basin studies and the lack of a critical mass of knowledge for such studies explain the small numbers of candidate plants for forthcoming auctions (Castro and Bueno, 2007). There is thus a short-term tendency for mean tariffs to rise, especially on the free market.

Meanwhile, financing conditions are favorable, with lines of financing available for the sector at adequate volumes and declining costs, including special lines offered by the BNDES, which are being refined by the elongation of financing timeframes, reduction of spreads and interest rates, and encouragement for the formation of special project entities (SPEs) and the use of project finance operations. In this scenario, there is a need to analyze the dynamics of Brazil's electric power sector, with its possible signs of imbalance between supply and demand. The consolidated regulatory framework affords mechanisms for expanding short-term supply to any energy source through new energy auctions. The positive forecasts of growing electric power demand may lead to some degree of mismatch as a result of the hydrological risk that is structural to the Brazilian electricity system, but the expectation is that a balance will be achieved by way of the new investments that are to be made and by energy matrix utilization planning.



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## Resumo

Tendo como referência um contexto macroeconômico muito favorável da economia brasileira em 2007, o objetivo deste artigo é analisar os impactos sobre o consumo de energia elétrica e sobre a ampliação da capacidade geradora instalada, buscando-se sinalizar um posicionamento sobre as reais perspectivas de equilíbrio ou desequilíbrio entre a oferta e a demanda de energia elétrica para os próximos anos.

**Palavras-chave:** economia brasileira; setor elétrico; cenários

