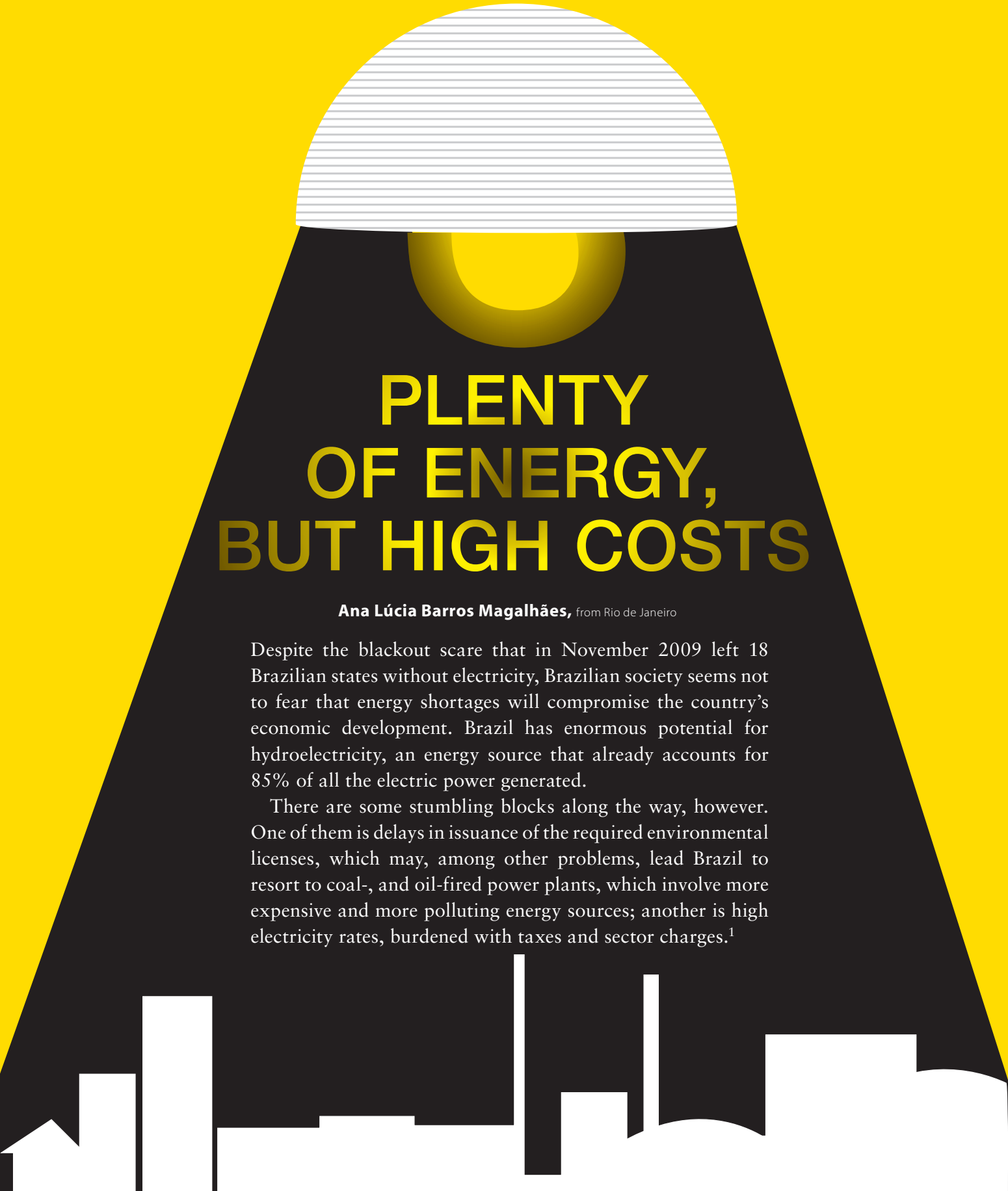


PLENTY OF ENERGY, BUT HIGH COSTS

Ana Lúcia Barros Magalhães, from Rio de Janeiro

Despite the blackout scare that in November 2009 left 18 Brazilian states without electricity, Brazilian society seems not to fear that energy shortages will compromise the country's economic development. Brazil has enormous potential for hydroelectricity, an energy source that already accounts for 85% of all the electric power generated.

There are some stumbling blocks along the way, however. One of them is delays in issuance of the required environmental licenses, which may, among other problems, lead Brazil to resort to coal-, and oil-fired power plants, which involve more expensive and more polluting energy sources; another is high electricity rates, burdened with taxes and sector charges.[1]

According to the Energy Research Corporation (EPE), the share of hydroelectric power in our energy mix ought to continue to be significant, because two-thirds of its total potential, 260,000 MW, is yet to be utilized. The issue, however, is that more than 70% of the potential to be exploited is located in Brazil's Northern region, far from the large consuming centers in the Southeastern and Center-Western regions.

In spite of the enormous distance, EPE Chairman Mauricio Tolmasquim recalls that the auction for the sale of energy from the Santo Antônio and Jirau power plants (the Madeira River Complex) revealed that even considering the transport costs, the price of energy reaching the consuming region is very competitive. "The price of energy from Jirau is US$49 per Mwh, while energy from Santo Antônio costs US$43 per Mwh. Thermal energy costs almost twice as much," he underlined. "And hydroelectric power derives from a renewable energy source that produces practically no greenhouse gases."

But there is still an environmental issue. João Carlos Mello, chairman of Andrade & Canellas, an independent consulting firm, points out that power plants in the Amazon cannot have large reservoirs, because an excessive increase of flooded areas would have a severe impact on the environment. Thus, the plants have to adopt the run-of-river system. "Consequently, if there is no rain, there is no power generation, as those plants are not able to store water," Mello explains. In his opinion, this will force Brazil to complement its energy mix with either coal- and fuel-fired power plants, both sources that are more pollutant and expensive, or with gas and nuclear energy.

The difficulty associated with obtaining environmental licenses for those plants is also a serious concern for the Federation of Industries of the State of São Paulo (FIESP). "During the first five years of the Lula administration, no environmental licenses were granted for hydroelectric plants," Carlos Cavalcanti, FIESP's energy director, says ruefully. "The Ministry of the Environment granted licenses to projects involving oil and coal but none to hydroelectric projects, yet this is the cleanest and cheapest energy source." He recalls that in a wind energy auction carried out late last year, the average energy price was US$80 per Kwh. Energy from an oil-fired thermoelectric plant costs US$100 per Kwh, whereas the average price of hydroelectric energy is US$39–US$44 per Kwh. Cavalcanti adds that in the energy auctions no hydroelectric projects have come up: "The government has to buy energy from thermoelectric plants because of an absolutely wrong decision made by the Ministry of the Environment."

On the other hand, José Antonio Muniz Lopes, Chairman of Eletrobrás does not believe that the delays in some hydroelectric projects caused by the lengthy environmental licensing process will create bottlenecks that may compromise growth of the Brazilian economy; nor does he believe that this issue will make our energy mix more pollutant. He says, "From our side, we are working hard to ensure that the requirements imposed by the

The greatest challenge in the electricity sector is delays in the granting of environmental licenses

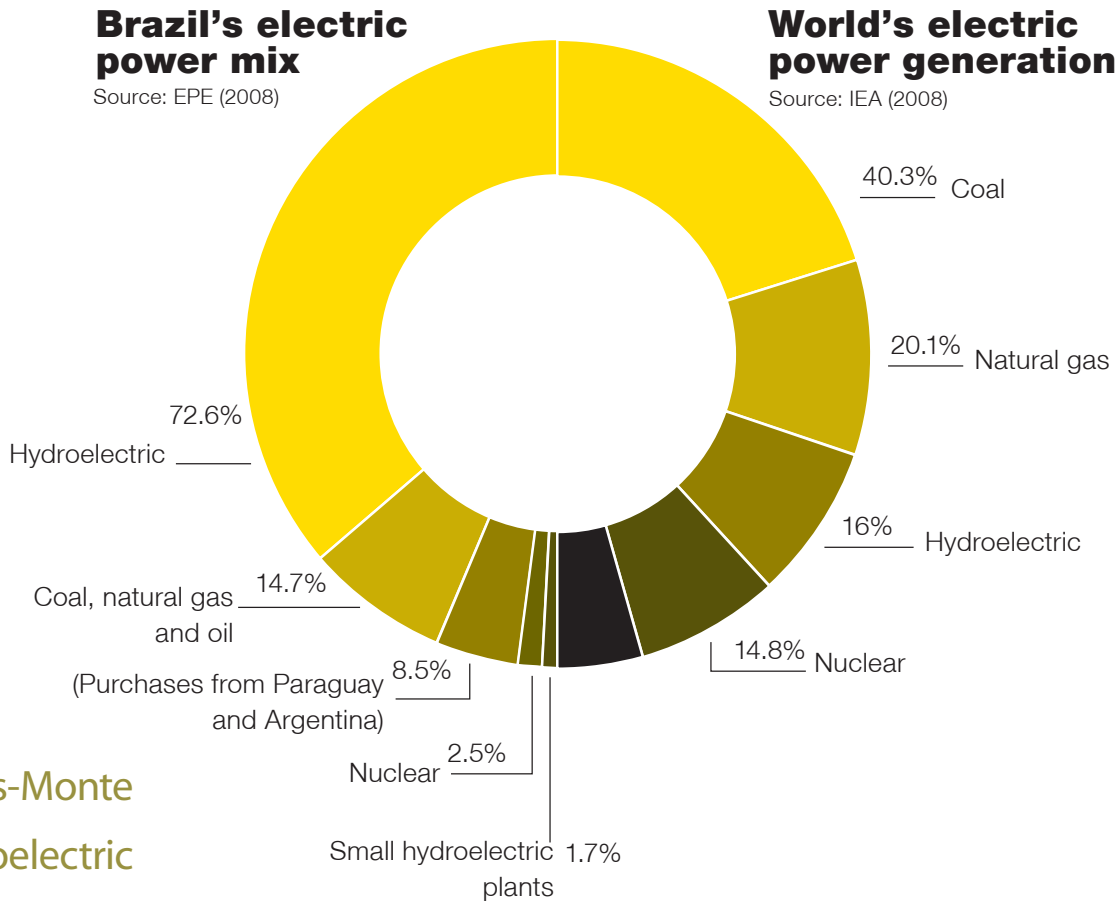


MAURICIO TOLMASQUIM
(EPE Chairman)
Photo: Public Relations/EPE

There is no reason to fear power supply shortages.



CARLOS CAVALCANTI
(FIESP's energy director)
Photo: Public Relations/FIESP



The Tapajós-Monte Belo hydroelectric complex includes two of the most important power plants for the country's near future.



JOSÉ ANTONIO MUNIZ LOPES (Eletrobrás CEO)
Photo: Jorge Coelho/Eletrobrás

environmental agencies are met, and I believe for this same reason that energy security is guaranteed in the years to come."

In addition to Santo Antônio, Jirau (under construction), and Belo Monte, for which an environmental license was granted in early February, though with more than 40 restrictions, Muniz Lopes notes that Eletrobrás is thinking about building five new plants on the Tapajós River in the state of Pará. The installed capacity of the Tapajós complex would be about 11,000 MW, generating 50 million MWh per year — enough energy to serve 28.5 million households.

"The Tapajós-Belo Monte hydroelectric complex includes two of the most important plants for the country's near future," Muniz Lopes emphasizes. He believes Brazil is currently working on completing projects that will ensure all the energy Brazil needs to grow in the years to come. "Those new plants will strengthen the country's energy system and provide energy security," he notes. "This year alone we are authorized to invest US$5 billion in energy generation, transmission, and distribution."

Environmental concerns

Carlos Cavalcanti says he is not concerned about energy supply either: "There is no reason to fear supply shortages. What we fear is that the international debate on climate change may give rise to unilateral

domestic legislation according to which the quality of the energy in a product will be a determining factor for its access to the world market." Cavalcanti believes that new legislation may hinder the exports of goods unless their production process has taken into account low-carbon-emission technology. "This could become an important trade barrier," he warns.

In principle this would not be at all bad for Brazil, where 85% of all electricity is generated from hydroelectric plants, which emit very little carbon. In China and India, for instance, coal generates 80% of total electricity.

EPE's Tolmasquim thinks the greatest challenge in the electricity sector is delays in the granting of environmental licenses: "The problem is that, because of the delays in obtaining environmental licenses for a hydroelectric plant, we may come to the auction and end up contracting an amount of hydroelectric energy that is less than adequate." The EPE chairman reports that he has been negotiating with government environmental agencies to shorten the licensing period. But he says that Public Attorney's Office lawsuits have delayed the process.

Tolmasquim says that carrying out an auction before the end of the first quarter of 2010 for the Belo Monte hydroelectric plant — to be the world's third largest, generating 11,000 MW — will be a significant step forward. This project has been on the drawing board for the last 20 years.

As to the energy mix, EPE research demonstrates that it is possible to outline a strategy whereby, within the next 20 years, 45% of all energy

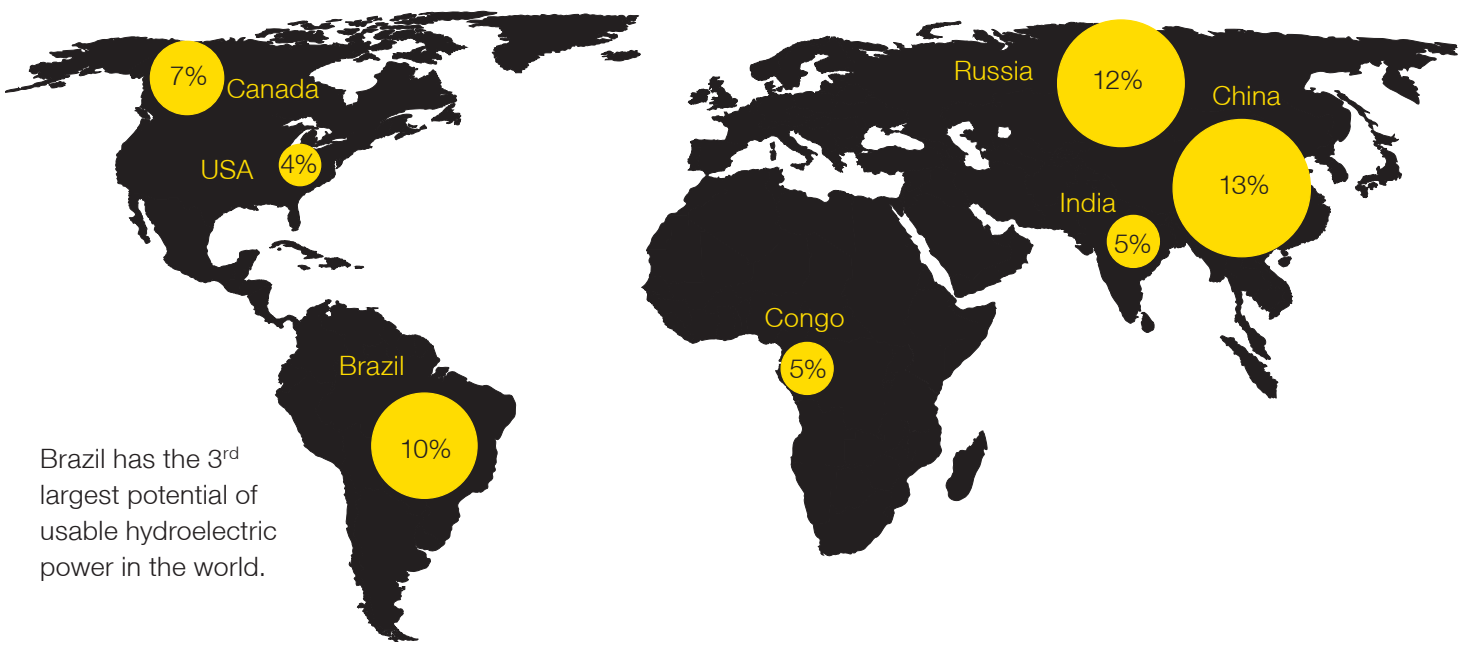
Energy in Brazil is among the most expensive in the world, mainly due to taxes and sector charges.

RICARDO LIMA
(CEO of Abrace)

Hydroelectric power

Source: EPE (2007)

Countries with largest hydroelectric power potential in the wold



Brazil has the 3rd largest potential of usable hydroelectric power in the world.

The industrial energy rate in dollars went up 22% a year between 2002 and 2007.



EDUARDO CARLOS SPALDING (Abrace)
Photo: Public Relations/CNI

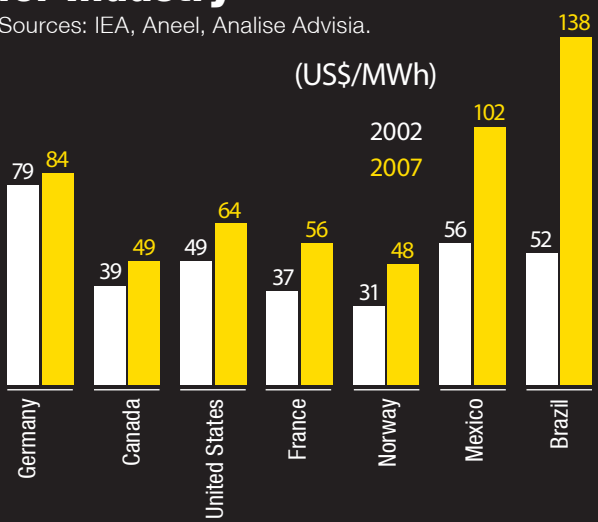
consumed in Brazil will be produced from renewable sources, because economic growth with reduced environmental impact is the major challenge around the world. Tolmasquim argues that "Countries with better access to clean, renewable, and low-cost energy resources, such as Brazil, may have significant competitive advantages."

Taxes and sector charge burden

If, on the one hand, there is no fear of a blackout, on the other, Brazilian industry, the major power consumer, believes there is a risk of rationing

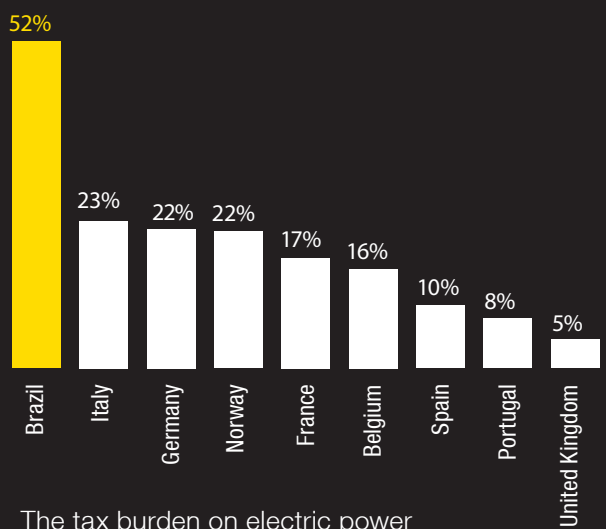
Electric rates for Industry

Sources: IEA, Aneel, Analise Advisia.

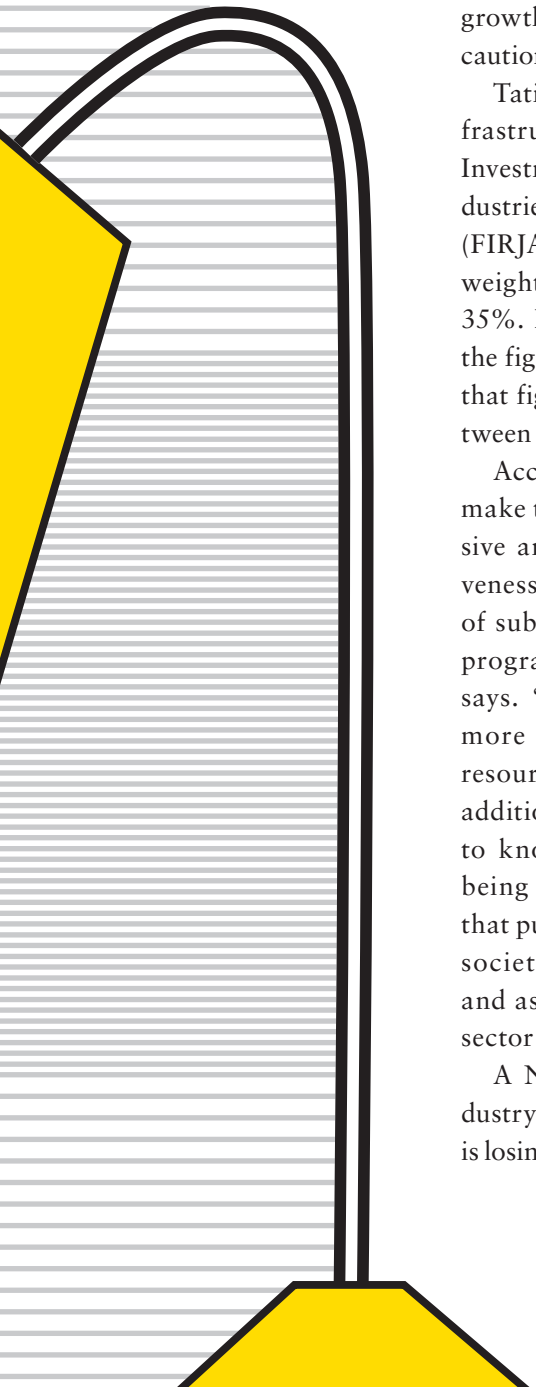


Tax burden on electric rates

Sources: Brazilian Securities Exchange Commission (CVM), Eurostat, IEA, Analise Advisia (2007).



The tax burden on electric power increased 11.5 percent points between 2003 and 2007, resulting in a 107% increase in the electricity rate.



caused by high energy prices. Ricardo Lima, CEO of the Brazilian Association of Major Industrial Power Consumers and Free Consumers (ABRACE), claims that energy in Brazil is among the most expensive in the world, mainly due to taxes and sector charges. "The price issue may be a catch. Taxes and sector costs account for 52% of the average Brazilian consumer's electricity bill. We risk compromising the country's growth because of energy costs," he cautions.

Tatiana Lauria, an expert in infrastructure at the Office for New Investment at the Federation of Industries in the State of Rio de Janeiro (FIRJAN), agrees with Lima: "The weight of taxes on energy rates is 35%. If you add the sector charges, the figure increases to 42%, whereas that figure is 12% in France and between 6% and 8% in the UK."

According to Lauria, those costs make the final product more expensive and cause a loss of competitiveness. "FIRJAN advocates repeal of subsidies and that no new grant programs should be created," she says. "Furthermore, we encourage more transparency in where the resources collected in the form of additional charges go. Society needs to know how those resources are being utilized." She also suggests that public hearings be held to allow society to put forward solutions and assess the costs and benefits of sector charges.

A National Confederation of Industry (CNI) study found that Brazil is losing competitiveness in international markets because of its high energy prices. According to Eduardo Carlos Spalding, who represents ABRACE on the CNI infrastructure committee, industries like steel, aluminum, petrochemicals, paper and cellulose, and soda chlorine are already feeling the consequences.

Spalding explains that unfortunately, to remain competitive, large Brazilian multinational companies such as Vale, Votorantim, and Gerdau are forced to direct new investment to other countries. The prices paid in Brazil are much higher than in countries we compete with. That is why Votoratim is producing aluminum in Trinidad & Tobago, Vale and Alcoa are considering building in Colombia, and Rio Tinto-Alcan has already discussed establishing an aluminum reduction plant in Paraguay.

Spalding says that the industrial energy rate in dollars went up 22% a year between 2002 and 2007. He believes that the costs built into the energy rates to support subsidies, such as low rates for low-income families, contribute to this price hike. He adds, "When we compare the average price of hydroelectric power, US$67 per MWh, with that of thermal power, US$83, this is clearly a fantastic opportunity. The problem is that we are pushing up the rates with additional charges and taxes."

[1] The main sector charge is the ESS (service charges of the system), which represents the cost incurred to keep the National Interconnected System reliable and stable.