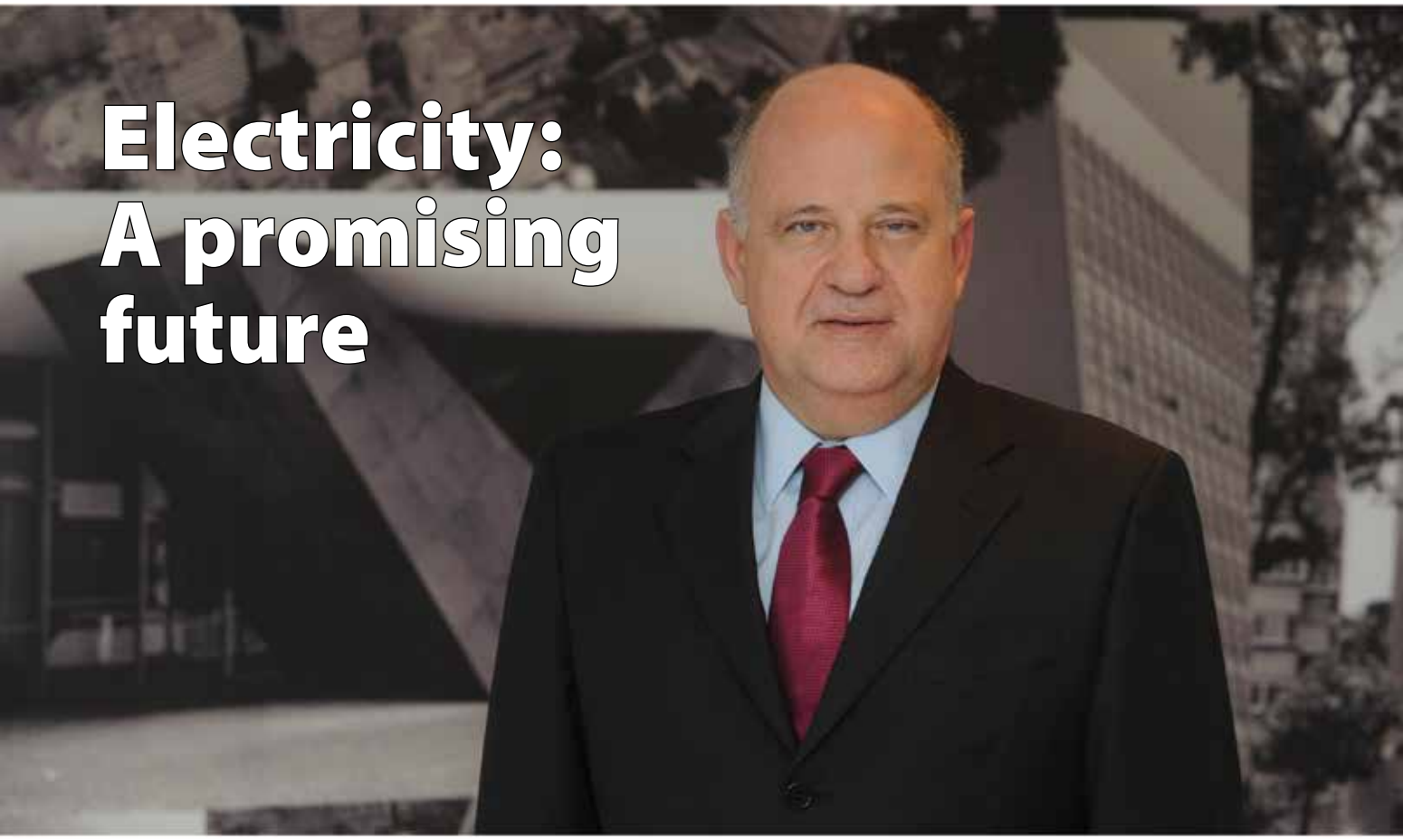
Electricity: A promising future



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ENGINEER MÁRCIO ZIMMERMANN is executive secretary of the Ministry of Mines and Energy. He worked on the construction of the Itaipu hydropower project and has held various positions in the energy sector, among them director of the Research and Development Research Center (CEPEL) and director of engineering for Eletrobras, a major Brazilian electric utility. Zimmermann assures us that Brazil is not at risk of electricity rationing, although there is always the possibility of interruptions. The system, he says, is structured to meet electricity demand and minimize the risks of interruptions. Over the next 15 years, he expects per capita consumption of electricity to double in line with the economic growth forecast. He considers this expansion feasible because the electric sector is well-regarded by investors and attracts capital.

***The Brazilian Economy*—What is Brazil's energy situation today?**

Márcio Zimmermann—Since the 1960s the Brazilian electricity system has always worked with a relatively small risk of a power deficit, no more than about 5%. This was a criterion used in other countries that we adopted for the hydrothermal system in Brazil. What does this mean? We should always have enough power plants and transmission lines to meet electricity demand. On the other hand, when there is a structural imbalance between supply and demand, this leads to rationing. That happened

in 2001 when our model was failing to attract investment because there were no guarantees to take to the bank, and there were no contracts for sale of electricity. Since 2003 we have corrected these problems and are now auctioning concessions for new power plants that [will keep us] five years ahead of projected future demand.

Is there a risk of rationing?

Brazil has never experienced rationing when there was balance between supply and demand for electricity. … This year water flows are lower than in 2001, yet the system is holding up well. Why? Because we built enough power plants and transmission lines, and even with less water in the reservoirs we have options, such as thermal power plants, that can meet the demand. … In May the risk to the electricity supply in the Southeast was only 4%, compared to 25% in 2001. ... The balance between supply and demand is very important. Worldwide no one works with zero risk to the electricity supply [because that would be prohibitively costly]. That would be absurd.

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Is it because of climate change that thermal power has been used more intensively in recent years?

When we planned the Brazilian electric system, it was very much based on the Canadian model. It is a hydrothermal system. We have probabilistic models for projecting the future flow of water, trying to minimize operating costs. What happens when we expect less water? The model protects the electrical system by raising the price [to balance supply and demand].

When water supply is normal, the short-term price of electricity drops significantly. The system operating cost is US$15 to US$30 per megawatt hour without thermal generation. Thermal power is meeting part of the market demand. The cost for 80% of the thermal power plants is US$100 and US$125 per megawatt hour.

How do we reconcile higher consumption and a stronger economy if there is a scenario of low rainfall?

So far, in all auctions for concessions for new power plants, the bids were more than sufficient to meet future demand for electricity. There are more people who want to invest in the Brazilian electricity sector. Over the past decade, ours has been one of the world's most successful in attracting foreign investment. Why? By having a well-structured framework. Investors have the guarantee of power purchase agreements (PPAs) that they can use as collateral to obtain project financing from banks. This means that the investment-funding wheel keeps on turning. We do auctions for concessions of electricity production three to five years before [projected increase in demand]. …The more entrepreneurs believe in the sector—and this has been happening—the more competition and bids in auctions [thereby ensuring the future supply of electricity].

What is the outlook for sources of energy in Brazil?

I believe that in the next decade hydropower will exhaust its potential. Energy sources that use fossil fuels have the challenge of improving technology to reduce emissions of CO_2 (carbon dioxide). Nuclear energy will also be an alternative for the next decade since Brazil has the reserves and technology for uranium enrichment. Solar and wind energy have great potential. Brazil is in a very comfortable position to double per capita consumption of electricity.

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take up production of ethanol strongly. …We had some recent problems that affected sugar cane crops and that caused problems for certain companies, but the government policy has always been to work hard for ethanol to be competitive again. Two or three years ago, sugarcane products were 18% of the total energy produced in the country compared to 14% from hydroelectricity. Ethanol and biomass have a huge weight in energy production and this has allowed Brazil to achieve 46% renewable energy.

You said a lot of foreign capital is coming here. How much will demand for electricity grow?

Today, our per capita consumption is 2,400 kilowatt-hours a year. In the United States it is 15,000 kilowatt-hours—almost six times more. European countries consume between 6,000 and 15,000 kilowatt-hours a year, South Africa more than 4,000 kilowatt-hours. Investors know Brazil has a growing middle class, which increases consumption. … On average energy consumption in Brazil grows 4%, 5% a year.

What is the government's ethanol policy?

Brazil has a comparative advantage producing ethanol. We were efficient to the point of having the cheapest ethanol in the world. The yield of ethanol per hectare beats by far the yield from American corn. I believe that Brazil is likely to

For a long time, when there were problems from power surges, there was talk of the need for a major transmission line to connect the entire electrical system. Are we still missing that?

Brazil currently has only one capital that is not linked to the Brazilian electricity transmission network; that is Boa Vista in Roraima state. We auctioned the line for that last year, and it should enter the system at the end of 2015 or early in 2016. Brazil's network had a little over 70,000 km of transmission lines in the early 2000s and now has 120,000 km. Brazil has not stood still. We have one of the largest laboratories for high-voltage research in the southern hemisphere—the Center for Electrical Energy Research (Cepel). Cepel is building an ultra-high-voltage laboratory in Adrianopolis in the state of Rio de Janeiro.