

THE PRIVATIZATION OF BRAZIL'S ELECTRICITY INDUSTRY:

SECTOR REFORM

OR

RESTATEMENT OF THE GOVERNMENT'S BALANCE SHEET?

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for the
Inter-American Development Bank
January, 2002

BACKGROUND

The Brazilian Power Sector, Latin America's largest, unique among energy suppliers to the world's leading economies, is almost completely dependent on one resource for its energy supply: water. Of its 65, 134 MW of installed generating capacity, in 1998 more than 90% was hydro. A substantial amount of that hydro capacity is located on only a few rivers. The sites for the generating facilities, by virtue of the nature of the resource, are generally far removed from major load centers, leaving the country highly dependent on long transmission lines to move electricity from the producer to the consumers. This dependence greatly complicated Brazil's coordination and optimization in the use of its resources. Seasonal and regional differences in precipitation and water levels, coupled with the fact that most dams are multi-purpose facilities, providing irrigation and navigation as well as energy production, gave rise to a very sophisticated national model for coordination and dispatch. The model worked quite well in operating the generation and transmission sectors in a reasonably efficient manner.

Historically, the ownership of the power sector has changed from private to state and then back to private ownership. Indeed, the nationalization of the industry was only completed in the late 1970's, and even then it was not 100% nationalized.¹ State ownership, however, did not necessarily mean ownership by the national government. Although the Brazilian Constitution vests responsibility for the electricity sector with the

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¹ There were scattered distribution properties such as those in Tocantins and in parts of Minas Gerais which were owned by private investors. There were also privately owned self-generators.

national government, in fact, much of the distribution sector was owned by state governments. In some states, including major ones such as Sao Paulo, Minas Gerais, Parana, Rio Grande do Sul, and Rio de Janeiro, the state government-owned utilities were at least partially vertically integrated. By the early to mid 1990's when restructuring came on the agenda, the industry structure was clear. With the exceptions of nationally owned distribution companies in Rio de Janeiro, Espirito Santo, Brasilia and a few scattered, privately owned companies, the distribution companies were, as noted, owned by state governments. The part of the industry owned by the national government was generally housed under the umbrella of the government holding company, Eletrobras. These entities included four large generating and transmission companies: Chesf, FURNAS, Eletronorte, and Eletrosul (later Gerasul); the industry research arm, CEPTEL; and the energy efficiency program, Procel. The huge Itaipu hydro plant was operated by an independent governmental authority, created pursuant to a treaty with Paraguay, with whom the facility is shared. The entire electric sector was, nominally, at least, subject to the "regulatory" authority of the National Department of Water and Energy (DNAEE). DNAEE's staff was almost entirely composed of employees of regulated entities on loan to the regulator for stated periods of time, and was anything but independent. While it had a role in approving tariffs and was often consulted on industry related matters, it lacked an independent governing board, any independent and final authority of its own, and functioned generally as only a small piece of the overall bureaucratic structure of the industry. Overseeing DNAEE and responsible for policy within the sector was the Ministry of Mines and Energy.

The electrical network of the country was not fully integrated. At the time privatization was first contemplated in the early 1990's, there were three distinct and unconnected networks. The first linked the south and southeast parts of the country. This region was of course the locus of the biggest load centers in Brazil. The second network was that of the northeast system which largely moved energy from power stations on the Sao Francisco River to load centers all over the region. The third network, although not really a network in the true sense of the term, was that of the north. It consisted largely of unconnected, self-sufficient, distribution systems. Because the synergy and efficiency gains from interconnections were so obvious, plans were in process at the time privatization was undertaken to build a link between the south/south central and northeastern networks. That line was finally completed in 1998.

The general state of the industry at the time privatization was undertaken was somewhat mixed. The generation and transmission sectors, as noted above, were reasonably well run. Plant was generally well maintained and the system optimization and dispatch operations were internationally regarded. Perhaps the biggest problem with the generation sector was the fact that it was so dependent on hydro. It needed the diversity that more thermal capacity would provide, particularly more peaking capacity.

The distribution sector, however, presented a different picture. With some exceptions, most notably in Minas Gerais and Parana, the sector was not as well regarded as the generation and transmission sector. Non-technical losses were high, and many systems suffered from lack of investment in maintenance and new equipment. Some were

overstaffed and had been subjected to various forms of political abuse. Rural areas of the country had been inadequately served. Market penetration rates in rural Brazil ranged widely from state to state. Generally speaking, and not surprisingly, rural areas of southern and southeastern Brazil were better served than rural areas of the poorer states in the northeast and north. The range was from 96% in Santa Catarina to just .8% in Para. Overall, the estimates of rural electrification rates were imprecise, but ranged from 45% to 75%. Rural electrification was not a matter left exclusively to state government-owned distribution companies; there were a few national programs designed to promote rural electrification. A surcharge on electricity known as the CCC was used to subsidize the transport of oil-derived fuel to generators serving remote, unconnected systems in the Amazon Basin. The PRODEEM, a pilot program operated by MME, provided subsidies for the installation of renewable generating facilities in rural communities that lacked electrical interconnections.

DNAEE oversaw uniform national tariffs. The tariffs were intended to produce a legally mandated 10% rate of return on assets. Given that the cost structure of the various companies was not identical, an elaborate system of cross subsidies between companies known as the CRC, was devised and generally regulated by DNAEE. Designing and establishing tariffs, of course, while within the agency's jurisdiction, were heavily influenced, if not actually dictated, by other agencies of the government. While MME was nominally in charge, electricity tariffs were so critical to the overall economy and were linked to inflation, that Ministries with broader economic portfolios or the Central Bank played what might euphemistically be described as a major role in overseeing the tariff levels. Almost all customers were served under distribution tariffs. The few exceptions were some very large customers who purchased energy directly from Chesf and others who self generated. Large industrial users did not agitate for "free customer" status because cross subsidies among customer classes seemed to benefit industrial users, unlike the practice common in other countries around the world.

Brazil's power sector did not exist in a vacuum. The country's overall economic and financial position was the motivator of the privatization effort. The national government's debt was massive. So too, were the debts the states owed to the government in Brasilia. In fact, that was a major portion of the national government debt. Considerable pressure to both reduce the fiscal deficit and to increase social spending came from domestic interest groups who sought more social funding, and from international lenders, such as the IMF, which sought to impose a strict regime of fiscal discipline as a prerequisite for lending. The administration of Fernando Henrique Cardoso keenly felt the pressure. Cardoso, of course, took office with the enormous prestige of having developed and implemented the Real Plan, when he served in the previous Itamar Franco administration. The Real Plan had substantially reduced Brazil's chronically high rate of inflation. The Real Plan, therefore, was of paramount importance politically and substantively to the Cardoso team. Of course, that increased the already substantial pressure to reduce the fiscal deficit. In addition to fiscal matters, Cardoso was committed to liberalizing the overall economy. He sought to remove much of the protectionist and oligopolistic tendencies that, for years, had been characteristic of the economy. Cardoso believed that Brazil had to open its markets in order to compete in the global economy. His economic desires co-

existed with a clear recognizance to address social needs in a country with one of the most skewed distributions of wealth in the world.

The macro-economic perspective of the Cardoso government necessarily motivated its economic plan for Brazil's electric power sector. While demand for electricity was growing at a rate of about 5% annually, the government itself was unable and unwilling to raise capital to meet that demand. Administration officials regarded the sale of capital-intensive assets like the electricity industry, as a ready source of revenue that could be used to both reduce the national deficit and enhance social spending.

MOTIVATION AND OBJECTIVES

The primary driver of electric sector privatization was the overall macro-economic situation within which Brazil found itself. The fiscal deficit had risen to a level where its magnitude drove policy. Privatizing the power sector was particularly attractive to Cardoso for three basic reasons. First, it was one of the largest and most valuable publicly owned assets. Selling off the sector held out the promise of attracting substantial revenues for the treasury and clearing debt off the books. Second, selling off the state-owned distribution companies meant that a significant amount of state debt owed to the national government would be paid. Third, the federal government believed that it would be difficult to raise sufficient amounts of capital on its own to invest in the facilities needed to meet growing demand. While this third reason has led other countries to simply allow private capital to enter the market on an incremental basis while not privatizing existing assets, the Cardoso administration was convinced that it would be easier to attract private investment if everything in the electric sector that could be, was privatized. Cardoso also professed a strong desire to liberalize the country's overall economy by opening up domestic markets, promoting competition, and allowing market forces to work their magic. His administration's effort to undertake privatization of the power sector quickly appeared consistent with his overall economic policies.

Apart from meeting the demand for energy, there were a few other sector-specific factors that motivated privatization. In the generating and transmission sector, there were concerns about excess construction costs being incurred because of cartels among contractors. It was believed that private investors would both demand and cause greater competition in building generation and transmission. Another was the belief that much of the generating needs should be served by gas-fired combustion turbines, co-generators, or combined cycle units. Since there had been considerably more experience abroad with those technologies, and since there were some scale economies associated with both procuring and operating equipment, the opportunity for private investment appeared to offer potential cost savings. In the distribution sector, the motivators were even more basic. As noted above, this sector had suffered from some neglect and capital deprivation. As a result, service quality had suffered in many communities, and service was simply not being expanded to under-served or un-served areas. It was believed that private investment with appropriate incentives, would improve both the quality and extent of services. Privatization would put the distribution sector on a fully commercial basis,

something many believed was lacking in several of the state-run companies. In particular, there were concerns about excessive numbers of employees, politically manipulated tariffs, high non-technical losses, and favoritism in procurement practices. Finally, there was a belief that private distribution companies would establish tariff structures more reflective of costs.²

The problem however, was the unavoidable conflict between the two key national objectives of deficit reduction and fostering open and competitive markets. In privatizing strategic assets, it is only natural for a government to seek to maximize the proceeds of the sale. The formula for doing so is to maximize the private benefits for the buyer while minimizing the risks and social obligations. This formula conflicts fundamentally with the objectives implicit in liberalization, namely the symmetrical privatization of risks and rewards with clearly articulated and universally applicable social obligations. In Brazil's electricity industry, the question of social obligations in the form of providing universal service, meeting appropriate environmental standards, and promoting both the efficient use of energy and the use of environmentally benign technologies such as renewables, is absolutely fundamental. The country's lack of universal service, high number of low-income households, potential gains from promoting efficiency, availability of significant renewable resources, and the continuing controversies about the environmental costs of Brazil's behemoth hydroelectric plants took on added meaning. Questions regarding the country's social obligations became enmeshed in the struggle to implement a market economy and to achieve the appropriate socio-economic equilibrium. This is the context in which the Brazilian experience in restructuring its power sector must be evaluated.

THE PLANS

The overall plan devised for the power sector was for all assets to be privatized to the fullest extent possible. The extent of the possibilities was limited by legal, constitutional, and institutional constraints. In order to remove some of the constraints, Law 8631/93 was enacted. The statute was designed to pave the way for privatization. It did away with the requirement of uniform national tariffs, removed the requirement of a 10% rate of return, eliminated the CRC, mandated that distribution companies enter into long-term (ten-year) contracts for purchasing power at tariffed rates, established controls on the CCC, and required distribution companies to establish consumer advisory bodies to oversee quality of service. Three years prior to adopting the statute, the National Privatization Program had been established under the auspices of the state-owned Social and Economic Development National Bank (BNDES). In subsequent years, first LIGHT, the distribution company in Rio de Janeiro, and ESCELSA, the distribution company of Espirito Santo, and later, all of Eletrobras, were put under the aegis of the privatization program. The only key electrical assets omitted from the program were Itaipu, whose privatization was barred by treaty obligations with Paraguay, and the Angra nuclear units, whose state ownership was mandated by the Constitution. In addition, BNDES was granted authority to privatize the state government-owned distribution companies when a

² The author's conclusions as to the thinking of relevant officials are based on a series of discussions with a number of sector and BNDES officials both contemporaneous with and subsequent to privatization.

state's indebtedness to the national government made it attractive to take over control of a company. In several states however, the privatization of distribution companies (or, in some cases, vertically integrated companies) was left to the states to decide. Subsequently a decision was made to leave the existing transmission assets of Eletrobras in government hands for at least some period of time.

The entire electric sector privatization program of the national government was effectively put into the hands of BNDES. The only responsibility left to either government agencies with electric portfolios or to electricity companies was to coordinate the sector and to cooperate with BNDES' plans. Indeed, the electric companies themselves were prohibited from hiring outside consultants to advise them on restructuring.³ In short, the bankers, not the sector experts, had final say over all matters related to the disposition of all electricity enterprises either owned or controlled by the national government. MME was only left with responsibility for coordinating the sector. In some ways, that role might be better defined as having the responsibility of enforcing BNDES' plans and playing "catch-up" with the actions of the bankers by bringing some electricity logic to what had already been done. The assignment of the critical role to the bankers provides insight into the thinking of the Cardoso government in terms of balancing the country's conflicting goals of maximizing the proceeds from sales, optimizing the sector, and meeting social needs. The clear priority was maximizing revenues.

For a variety of reasons, BNDES decided to begin privatization with the distribution sector. There were probably more opportunities for quick productivity gains in distribution than elsewhere in the industry. Distribution companies, more than other components, had been abused politically. Monopoly licenses for distribution were easier to dispense in the market and regulatory void that existed at the time. Moreover, because many of the distribution companies were insolvent and some operated on a less-than-commercial basis, privatization held very real prospects for bringing in management which could quickly restore financial health. Once finances were in order, a distributor would become a viable customer to purchase energy from generators. Having a creditworthy buyer who could provide an assured revenue stream for a generator would then facilitate the enticement for private investors in transmission. Indeed, distribution licenses could be written to facilitate the subsequent privatization of generators. Another likely reason for beginning privatization with distribution was a general awareness that the development of market rules for generators would be a complex, contentious process with the potential to delay privatization indefinitely. Those imperatives also explain why BNDES was so anxious to begin privatizing that it did so in an almost perfect market and regulatory vacuum.⁴

While nothing specific about the structure of the market and its regulation was in place, there was a general notion about the direction to be pursued. There was a desire to open the generating market to competition by splitting up the giant generating companies within Eletrobras into multiple, competing entities and by easing entry for new

³ The ban on hiring advisers was verified by officials of both MME and Eletrobras subsidiaries in discussions with the author.

⁴ The thinking reflects what the author was told by the same officials referred to in Footnote 2.

generators. Distribution tariffs would follow the price cap model. There would be a transition period of ten years during which time distributors would be required to enter into firm power purchase agreements with generators to meet expected demand. After that, the market would open to full competition. It was also anticipated because of deficit reduction considerations that the government would invest nothing further in the sector. Although it was generally believed that the country's demand for electricity would exceed capacity by 2000, it was thought that existing reserves were sufficient until private capital for new generation began flowing into the country.

The glaring deficiencies of proceeding with privatization in the absence of market rules, market structure, a regulatory regime, or even a statutory framework for privatizing electricity assets was clear to almost all of the players. While BNDES plunged ahead to put ESCELSA and LIGHT on the auction block, MME was permitted to retain international consultants to assist in filling in the requisite details. The consultants' task was essentially twofold. The first was to make recommendations and put ideas on the table. The second, and as it turned out, the more significant, was to coordinate a task force of 60 key opinion leaders in the power sector who were charged with making specific recommendations regarding market rules, market institutions and regulation. Through this process, as well as through broader debates, a vision of a reformed electric industry began to emerge. Eletrobras would still exist, but in a drastically reduced role. Although stripped of its status as a holding company for the bulk of the country's generation, it would retain programs such as CEPEL and PROCEL under its aegis, would assume responsibility for indicative planning in generation, determinative planning in transmission, but curiously, retain the ability to finance sector expansion. Indeed, the retention of Eletrobras' financial role, coupled with the very significant role BNDES would come to assume in financing privatization, is a strong indication that the architects of Brazil's restructuring had less than complete faith in private markets. Market operations were to be assigned to two new institutions, the National System Operator (ONS), which was responsible for dispatching the system and safeguarding operational reliability, and the Wholesale Energy Market (MAE), which conducted financial clearing operations for the pool. It was recognized that DNAEE as structured, was inadequate to meet the demands of the new market. Therefore it was proposed to replace DNAEE with the National Agency of Electric Energy (ANEEL). Many of these ideas were contained in or envisioned by Law 9074/95, enacted in 1995, although the actual authorization to create ANEEL was not adopted until 1996. Also enacted in 1995 was a statutory framework for awarding concessions to private companies. That law did not require uniformity of licenses. Rather, those documents emerged in a haphazard manner involving ad hoc consultations within the government and with potential investors

In summary, what emerged was a transition period lasting as long as ten years, followed by a fully competitive generation market with multiple private companies competing, in addition to Itaipu and Angra. The private parties would include both buyers of existing state assets as well as new entrants. The distribution sector was privatized under a series of monopoly licenses, although over time, end users could obtain third-party access to the grid. The industry was under the regulatory jurisdiction of ANEEL, although that agency was empowered, perhaps even encouraged, to delegate some of its responsibilities to regulatory agencies created by state governments. ONS operated the

physical market and MAE the financial. The government invested nothing further in the sector, other than as a lender to private companies, and to administer programs like PROCEL, PRODEEM, and CEPTEL. The transition from the old model to the new was bridged through the use of long-term contracts and the facilitation of new entrants into the market.

FLAWS IN THE PLANS

The grand vision and its execution turned out to be severely flawed. While the flaws in execution are discussed in the sections on consumer and investor response below, it is useful to examine the critical areas where the plans themselves were severely flawed. In no particular order of importance, the major flaws were as follows:

Although there was consensus about the need for thermal generation in Brazil's resource portfolio, and that natural gas was the fuel of choice in that regard, restructuring of the natural gas market and industry was conducted on an entirely separate track than reform of the electric sector. This lack of coordination in the two energy sectors created markets that were in many ways incompatible and proved very costly.

The political and technical difficulties of privatizing the hydro plants were badly underestimated. In a hydro-dependent country like Brazil, interregional coordination must be carried out in order to fully optimize all relevant variables. That is complicated even in the face of common ownership, but when coordination is demanded of competitors, the difficulty is enormous. The social demands placed on the dams and reservoirs make the politics of privatization a single use of the water politically quite contentious. For example, how does one price water for agricultural and navigational uses versus electricity generation? Is there any politically and socially acceptable way to price the value of conflicting uses and needs? What is the value of ecological considerations? Under common state ownership, it is possible to arrive at an acceptable allocation scheme, but adding commercial considerations involving the privatization of one use of water makes matters extremely contentious and difficult. Several potential investors in Brazil's thermal generation were already highly sensitized to the difficulty of competing with existing hydro and very wary of schemes that might even marginally assist hydro generators. It was widely believed, too, that because the large hydro facilities, under state ownership, had been efficiently operated and required a lower rate of return than a private facility, privatization would likely increase costs. Thus, expectations of productivity gains that often help to shore up political support for privatization were not present. When all of these considerations are added to the general controversy about privatizing essential industries, particularly large employers like FURNAS and Chesf, Brazil's difficulties of carrying out privatization became apparent.

The plans inadequately dealt with transition issues. There was a virtual leap of faith that the private sector would make generation investments in time to avoid the anticipated shortfalls in capacity. For the same deficit reduction reasons that made privatization attractive economically, the architects of sector reform, focused as they were on deficit

reduction and the government's balance sheet, were simply unwilling to contemplate any role for the state as an investor in the power sector other than as a lender to private parties. The planners left little margin for error in their calculations. In part of course, they were both politically and intellectually constrained. Any hint of a future state role in power sector investment might undercut the basic arguments for privatization and reliance on markets. The inadequacy of transition planning was compounded by making generators the ultimate guarantors of supply. Although the rationale included lessening the burdens of the first-to-be privatized distribution sector and the presumably greater expertise and efficiency of private investors with thermal, particularly gas fired, generation, the result was ironic. Leaving most generation in government hands for a longer period of time meant that the risks associated with exclusive reliance upon private investment during the transition were greater, and perhaps left the national government bearing the ultimate burden. In short, no one was in charge of the transition because no one could be in charge. The problem was simply assumed away.

The decision to begin privatization even before articulating a clear notion of market structure, market rules, or such key institutions as the regulatory agency, created unrealistic expectations all around. Private investors interested in bidding for the assets put up for sale early in the process received little guidance permitting them to knowledgeably internalize into their bids the risks and obligations they were being asked to assume, as well as opportunities for gain. There are very real consequences of privatizing before establishing even a rudimentary regulatory and market framework. Attracting early investors into a country beginning the privatization of an essential infrastructure industry often requires the host country to pay a risk premium to the investor. It has almost become axiomatic that over time, with the growing maturity and predictability of the new regime, risk premiums can be reduced, and ultimately eliminated. Nonetheless, the initial investors do set a benchmark of sorts that can be balanced by subsequent investors against experience as time goes on. That initial risk premium in Brazil was almost certainly elevated because of the almost complete market, policy, and regulatory vacuum within which the early privatization occurred. That had the effect of setting an unrealistic benchmark for future investors and the legal effect of rendering the authority of subsequently created regulatory agencies and rules highly uncertain. Another consequence is that BNDES was obliged to make the initial offerings to investors as attractive as possible. Given that investors had so little context with which to evaluate the risks they were assuming, the initial offerings were made even sweeter than they would have had to be if a market and regulatory context had existed. The attractiveness was further enhanced because BNDES had, as one might expect, a laser-like focus of revenue maximization / deficit reduction over other objectives. These early offerings set a precedent for minimizing social obligations. More succinctly stated, "premature" privatizations caused a golden opportunity to internalize social obligations to be missed and created unreal, and in some cases, counterproductive, benchmarks. It also doomed policy makers, market designers, and regulators to play catch-up. Given the lack of history of independent regulation and its embryonic state in Brazil, for regulators in particular, the burden was especially heavy.

Beginning privatizing before establishing a framework was a virtually inevitable result of the intense focus on revenue maximization / deficit reduction. The primacy of that focus distorted both the planning and implementation of restructuring. Indeed, one could argue that the model Brazil followed in electric restructuring was one in which privatization was first and foremost, and sector reform was a secondary matter, put into effect as an after-the-fact justification. Macro-economic and fiscal considerations took primacy over sector specific considerations. There is considerable evidence for that point of view which will be elaborated upon below. One key piece of evidence, however, is that the prime role was assigned to BNDES rather than agencies with more sector specific experience and knowledge.⁵ While some of the motivation for that was undoubtedly the fear, not altogether unrealistic, that sector specific agencies would passively, if not actively, resist privatization, it is also true that by assigning the bankers primary responsibility, it effectively removed those prudent restraints that would have been imposed by officials who focused on long-term optimization of the sector. Indeed, one is struck by the contrast with the restructuring of the telecommunications sector, where sector specific officials played the central role in restructuring. Other evidence of the primacy of such fiscal considerations as revenue maximization, is the repeated pattern of missing opportunities for internalizing social obligations, the inadequacy of articulated productivity expectations and service standards in licenses, the chronological order followed in implementing reforms, the virtual enthusiasm for using government facilities to finance privatization in order to change debts on the government's balance sheet from liabilities to assets (26% ultimately came from BNDES alone), and the lack of any demonstrable or transparent effort to weigh macro and micro economic factors. One further piece of evidence of the priority was that the timing and terms of the ten-year transition contractual obligations between distributors and generators, as demonstrated in the case of Gerasul, were such that the contracts appeared to be more of an effort to reduce risks imposed on the investors in the next entity to be privatized than to serve the stated purpose of smoothing the transition. In short, it is difficult to avoid the conclusion that the plans were heavily biased toward short-term fiscal results to the detriment of long-term implications for both the sector and the economy in general.

The plans essentially ignored, or paid short shrift, to the social obligations and expectations, such as rural electrification, environmental considerations, subsidies to low income consumers, promotion of energy efficiency, and support for renewable energy. Even such matters as quality of service standards and productivity received remarkably little attention. Given the fact that no electrical system in the world was ever devised for economic purposes alone, the omission is particularly curious. The reasons for this are probably attributable to a variety of factors. One, of course, was the role of BNDES and the role of fiscal situation as the critical drivers for reform. A second possible explanation was the perception that much of the sector, distribution in particular, had been subject to political abuse, so any deviation from economic considerations in restructuring was viewed as intolerable. Indeed, some of the subsidies and cross subsidies built into the old system were viewed, with some justification, as inefficient and wasteful. Many architects of the new regime doubtlessly concluded that their efforts were best served by confining

⁵ The status of BNDES being in charge of the privatization was a circumstance which the Cardoso Administration inherited from its predecessors, but one which it chose to continue.

their vision to economic and commercial considerations. Regardless of the reasons, the opportunity to internalize relevant social considerations into the economics of the sector was missed. What is particularly ironic is that by doing so, some portion of the long-term fiscal burden of the state would have been reduced by the amount of social spending avoided through internalization of electricity externalities.

One final flaw in the plans worth noting was underestimating the significance of currency risks. There are several reasons for underestimating them. Perhaps the most important is the central political reality of the Cardoso administration. Its political prestige and capital rested heavily on the Real Plan. That plan had significantly reduced, if not eliminated, Brazil's chronic inflation and gave the country a stable currency. Officials of the government could not, politically, and perhaps not even intellectually, follow a course of action that in any way cast doubt on the strength of the Real. Thus, even though investors would have to pay for much of their fuel and equipment in hard currency, to allow tariffs to be indexed to rates of exchange or calculated in hard currency denominated terms, was simply out of the question. In addition to the obvious political reasons for not acknowledging currency risk, no one was quite certain what the overall reaction would be to foreign investors in local infrastructure. In order to avoid the notion of preferential treatment, and perhaps to better acclimate foreigners to local circumstances, some of the planners adhered to the notion that the investors in the power sector should be subject to the same currency risks as their customers. There was also good reason to believe that the investors were in a much better position to efficiently hedge currency risks than were consumers. Regardless of the precise reasons, however, currency fluctuation was one risk the reformers were simply unwilling to obviate.

EXECUTION OF RESTRUCTURING

The execution of restructuring has had its disappointments. The most obvious source of unhappiness, of course, is that demand has exceeded supply and that the leap of faith that sufficient private capital would be enticed into the generation sector in time to avoid shortages proved ill advised. Authorities have been forced to order rationing of electricity. The shortage has caused severe economic stress and given rise to many commercial and legal disputes. There were a number of reasons for the shortage. The most obvious is that a drought reduced available hydro capacity. While droughts are obviously facts of nature beyond the ability of humans to control, cycles of drought have always been a well-known fact of life in Brazil. Electricity officials in Brazil have always factored it into their planning, and prudence would dictate that they always should. Thus, blaming the shortage on the drought is not a sufficient explanation. For reasons that will be discussed below, the roots of the crisis are found in more fundamental failures. A viable energy market was never created. There was no symmetry between the fuel and energy markets, which worked at cross- purposes with each other. Commercial arrangements proved to be virtually impossible to enforce. The regulatory regime was never fully able to establish viability and to assert full independence. The symmetry of risk and reward was skewed in ways that made both consumers and investors unhappy. Incentives proved ineffective to do much more than attract initial investment, and were

skewed in ways that neither improved efficiency nor assured the quality or reliability of service. Market institutions such as MAE and ONS were deadlocked and unable to make critical decisions. All of these matters will be further elaborated in subsequent portions of this document. Nonetheless, it is impossible to discuss the execution of the restructuring without acknowledging these failings.

Privatization of existing utilities appears to have ground to a halt, at least for now. Much of the distribution sector, however, has been privatized. While there are notable exceptions in Minas Gerais, Parana, Rio Grande do Sul, Goias, and other states, much of the distribution system is now in private hands. Since 1995, 24 distribution companies, totaling 64% of retail sales, were privatized. The prices successful buyers paid averaged 45% above the minimum acceptable price. Many prominent and respected domestic companies as well as many from Europe, North America, and from other parts of Latin America became investors in the Brazilian electric market. This was accomplished with significant state involvement. As noted earlier, more than a quarter of the financing for privatization was originated by BNDES. The enthusiasm for private financiers appeared to be somewhat limited. The story in generation is somewhat different. Although approximately 23% of the sector is in private hands, with the exception of Gerasul, none of the major generating enterprises owned by the national government has been privatized. The efforts to privatize FURNAS, Chesf, and ELETRONORTE have been mired in controversy, the resolution of which is nowhere in sight. The privatization of Gerasul was only accomplished by compelling distribution companies to sign long-term contracts to buy energy. Investors were unwilling to put their trust in a non-existent market.⁶ They demanded and received assurance of revenue streams. The large, vertically integrated companies of Minas Gerais and Parana, for somewhat different reasons, remain in the control of their state governments. The Azevedo administration in Minas had agreed to sell a significant minority share of CEMIG to two U.S. companies that would each acquire a seat on the board of directors. The directors appointed by the two companies, pursuant to the agreement, would possess veto authority over board actions. Upon replacing Azevedo as governor, Itamar Franco challenged the lawfulness of the arrangement and was able to put the entire transaction in legal limbo. While one can dismiss the Minas experience as *sui generis*, the Parana and Goias experiences are very telling. The vertically integrated COPEL is regarded by many as the crown jewel of the Brazilian power sector. Its reputation as a highly professional, fully commercial organization is well established. The state it serves is one of Brazil's most prosperous. Nevertheless, when COPEL was put up for sale by the state government at the end of 2001, not a single investor chose to put in a final bid. The State of Goias encountered a similar experience when it put its utility, CELG, up for bid. It would appear that, for the moment at least, there is little appetite in capital markets for buying utilities in Brazil.

The role of regulation has gone through a metamorphosis worthy of note. ANEEL was, as noted earlier, created after the commencement of privatization. In some ways it appears to have been an afterthought used to rationalize what had already occurred. Nonetheless, several developments are noteworthy. The first is that the agency has never

⁶ The sentiments of investors were communicated to the author by foreign and domestic investors, and their advisers in a number of conversations during the privatization process.

been fully able to assert its independence. Its policies regarding protecting investors against uncontrollable currency risks, whether correct or not, is believed by many investors to have been driven far more by the government's general opposition to indexation, for reasons already noted, than by any sector considerations. Some have contended that ANEEL, in its deliberations on which costs it will allow to be passed through, has become more an agent for the central bankers than a regulator.⁷ Strengthening this view are two other factors. One is that ANEEL, despite the Constitutional provision that assigns specific responsibility for the power sector to the national government, was given authority to delegate some of its authority to state regulatory agencies, where they exist. Such agencies do, in fact, exist in a number of states, particularly in many of the larger ones. The notion of allowing ANEEL to delegate authority was to decentralize decision making in the sector. It was seen as consistent with the development of a competitive market. ANEEL, however, has delegated very little authority to its peers at the state level, and has never established any real criteria for doing so. Rather, where it has delegated, it has done so in agreements negotiated separately with each state. It has never delegated much more than the ability to handle consumer complaints and some audit functions. While some have seen the lack of delegation as bureaucratic turf protection or avoiding confusion, others see it as another missed opportunity. Proponents of that perspective contend that the states should have the right to review the power purchases of the distributors serving it. The fact that states may well have diverse points of view, they argue, would be a positive contribution to making competition more robust. Indeed, states may well have established differing normative values in determining which costs could be passed on to consumers. That diversity could well make it easier for many different producers and different resources to find a niche in the marketplace. Central regulation of the market was likely to limit both opportunity and competition. In the context of the shortage, some states have contended that, left to their own devices, they could have spared their consumers the trauma.⁸ The lack of delegation, decentralization advocates suggest, was, in fact a fear of both markets and loss of control. There was simply too much at stake in terms of privatization, influencing, if not controlling, investment, as well as fiscal and monetary policy to let policy drift too far from Brasilia.

The ultimate blow to the notion of ANEEL as an independent regulator, course, was the institutional response of the government to the crisis. Rather than allowing ANEEL to continue to exercise its authority, the Cardoso Administration created the Energy Crisis Management Chamber (CGC) to handle energy related matters. Indeed, it was the CGC, not ANEEL, which ordered the implementation of rationing. ANEEL, as well as MME and related agencies were simply preempted. ANEEL was reduced to being an advisor to CGC, which took on critical regulatory responsibilities. While it would not be unreasonable to see the crisis as so critical that extraordinary efforts were called for, the creation of CGC clearly signaled that regulatory independence was not taken as a serious proposition by higher authorities. It suggested that when pressed, the government was willing to override its "independent" regulator. It is a precedent likely to be remembered by parties who, in the future, feel aggrieved by regulatory decisions. In some senses, it

⁷ Comments made by several investors to the author.

⁸ This view was specifically advanced to the author by ranking officials in Rio Grande do Sul, but appears to have been shared by officials in some other states as well.

could be argued, the process has become perhaps even more politicized than it was prior to privatization.

However it is unfair to be too critical of ANEEL in a country with no tradition of independent regulation. To facilitate the acceptance of regulation, MME had proposed that a substantial amount of money be committed to developing Centers of Excellence, academic programs for research and study on regulatory matters, in universities around Brazil. The idea was to build an intellectual infrastructure that would enable regulation to function at level worthy of respect and attention. Unfortunately, the program was defunded, depriving ANEEL of the possibility to strengthen the agency and its acceptance by higher authorities and the general public. In trying to catch up with the problems associated with privatizations which preceded its existence, the agency had to struggle in very difficult circumstances. Indeed, scarcely one week after it came into existence, it had to deal with a major crisis. That Rio Light experience, discussed below, made it very difficult for ANEEL to establish a positive image for itself, or for regulation, in the public eye. It did, however, make an honest effort to protect consumers and establish penalties for inadequate service.

The agency has conducted itself very professionally. Both the directors and staff have been well trained and well informed. ANEEL has tried to make the regulatory process transparent through extensive use of public hearings and the Internet. These positives, however, exist in a setting that leaves many observers cynical about the future of “independent” regulation in Brazil’s power sector.

Nor should the creation of the CGC be dismissed as politicizing the electric market. The magnitude of the shortage has made this situation inherently political, especially because of the failure by ANEEL, MME, ONS, and other entities to properly inform authorities and the public. Some contend that these agencies did provide indications about the pending crisis, but the higher officials receiving the reports were less than receptive. In 1999, MME had proposed several measures, including the construction of emergency thermal plants, to avert a supply crisis. These measures were never implemented because of disagreements among MME, ANEEL, Eletrobras, and Petrobras over pricing and fuel supply. Given this history, it is easy to understand the Cardoso administration’s lack of confidence in the ability of ANEEL and other existing agencies to resolve matters on their own..

The evolution of the electricity market itself is still incomplete. The reasons for its incomplete status has been fully discussed in the paper, “The Brazilian Power Sector Supply Crisis,” prepared by Mario Pereira of Power Systems Research, and need not be discussed in any depth here. The point to note, however, is that market structure, like regulation, was a matter deferred until after privatization had begun. It is a further indication that the restructuring of the power sector was less about markets and sector efficiency than it was about selling state owned assets.]

One aspect of market evolution that does deserve elaboration here arises directly from a flaw in the plans themselves, the failure to integrate the restructuring of the gas and

electric markets. They proceeded on separate tracks and, as it turned out, at cross-purposes. Brazil's need for thermal generation (primarily for firm energy) was clearly recognized at the time restructuring was undertaken. It was, with some justification, widely believed that thermal plants could not compete on the margin with hydro facilities, so their output was less likely to be dispatched under normal operating conditions.⁹ Clearly, the marginal cost of running river water through a turbine was less than that of purchasing fuel, burning it to produce steam, and running the steam through the turbine. In Brazil, there was little choice as to which fuel was to be used. There is some coal in southern Brazil, but it was not present in abundance, and its quality, from environmental and efficiency standpoints, was undesirable. Using oil-derived products for fuel was also unacceptable for reasons related to price volatility, security of supply, and environmental concerns. Gas was the obvious fuel of choice. While there is natural gas found in a number of locations within the country, the most promising sources of supply were found in neighboring countries, primarily Bolivia and Argentina. In order to enable the importation of gas, wells and pipelines were needed. The financing of the drilling and pipelines required assurances of revenue streams, which, in turn necessitated long term, take or pay contracts with gas users. Moreover, given that the contracts were international they would require payment in U.S. dollars. The economic logic was clear. The problem was that for plants being used only to assure firm energy, the economics simply could not be made to work. It was not reasonable to incur long term, take or pay obligations while selling only on the margin. It was also quite risky to assume contract liability in dollars but receive payment in Reais. . Additionally, because of the market power exercised by Petrobras in natural gas, generators were not even free to negotiate favorable terms of any kind. In short, the two markets were simply incompatible and asymmetrical.

SOCIAL IMPACTS OF RESTRUCTURING

Restructuring an essential industry has social impacts as well. In the case of electricity, those social impacts are both internal and external. The internal impacts refer to the nature, availability, and effect of the service itself. External impacts while not necessarily inadvertent, occur because of the way in which services are provided. Environmental impact is an example. Social effects like regulation and market structure were not of paramount concern..

The environmental impact of restructuring differed from historical debates about Brazil's large hydro projects. Where environmentalists have criticized the electric sector and, some international lenders, for insensitivity to ecological concerns about mega-hydro development, this concern is largely irrelevant to current circumstances.¹⁰ Although there are hydro sites still available for development, the country's energy shortage points out the deficiency of near- total dependence on a single resource. The environmental focus in electric restructuring must necessarily be on market structure and regulation, pricing, incentives, internalizing externalities, and promoting efficiency and renewables. While

⁹ Investors were very outspoken on this subject from the first opening of the generation market to private investment.

these received some attention during privatization, maximizing revenues from asset sales took precedence. .

For many years, Brazil's the benefits for the power sector from promoting the efficient use of energy have been recognized. One percent energy savings annually was considered an achievable goal that would avoid US\$300 million per year investment in new generation and reduce carbon emissions of 1.7 million tons per year during the next decade. The importance of efficiency was reflected the initial licenses granted to investors in distribution companies. The licenses required that a company spend 1% of its revenue on efficiency.¹¹ Initially, companies were allowed to use ½ of that for supply efficiency, and were free to use the other half on advertising efficient use of energy. Although these requirements were not always vigorously enforced, there was a widespread belief that allowing the funds to be used in this manner was ineffective. ANEEL was persuaded as well. The regulators then changed the rule to require that the full 1% be used to support efficiencies in use. ANEEL also ended the discretion that distribution companies had to use the funds for advertising. Congress adopted a new law which required that ½ of the 1% be paid by the distributors directly to the Ministry of Science and Technology which would then use the money to promote demand side efficiency. Currently, the funds are used partially for energy efficiency and partially for research and development. The R&D funding's objective is to build a strong national research capability. Over time, the amount dedicated to research will increase at the expense of efficiency programs.

With the possible exception of the 1% requirement, the incentives and programs designed to enhance energy efficiency have focused almost exclusively on programs external to operations of the industry. Even the 1% requirement is more of a command and control approach. Failing to internalize efficiency into market operations appears to have erected obstacles to capturing energy efficiency gains. Placing responsibility for the ultimate supply burden on the generators rather than the distributors meant that serving future demand would emphasize supply-side, not demand-side measures. Had the responsibility for being the ultimate supplier been assigned to the distributors, the outcome could have been quite different. If pricing is right, distributors that only buy energy for resale to end users ought to be financially indifferent to whether customers meet their electricity needs through consumption or through efficiency. With proper incentives, distributors can even become agents for energy efficiency. Given the general lack of energy service providers that might have been a prudent course for Brazil to follow.

Restructuring compounded the error of placing the ultimate supply burden on the generators by providing distribution companies with an incentive regime that aligned their economic interests with the generators rather than with the efficient use of energy. The price cap regime that was employed capped the price charged to the customers instead of capping the revenue the utility was allowed to retain. Price caps were chosen

¹⁰ Although actual hydro construction is not a current issue, there is still a vigorous debate over the environmental impact of hydro power. A recent study conducted in Rio de Janeiro, suggests that hydro has significant CO2 ramifications.

¹¹ Officials at Procel advised the author that its calculations of the gains from one percent energy savings was the basis for building the one percent requirement into distribution licenses.

over alternative pricing regimes because they had broad international acceptability, were considered to be more predictable and less subject to regulatory manipulation. And international financiers liked them.

The Brazilian price cap model greatly affected energy efficiency. It caps the price charged to an individual customer per unit of consumption. The distributor makes its money based on the actual amount of energy that passes through its wires. Thus, the more energy consumed, the more revenues for the company.

The risk to the distributors of reduced throughput was recognized in the initial contracts between generators and distributors. It was in dealing with that risk that the ultimate burden of supply was placed on generators. Annex V was added to the supply contracts to relieve the distributors of the risk of a decline in throughput in the event of mandatory curtailment of use. Generators were required to compensate distributors for the energy they were obliged to purchase but did not need. But the distributors were not given incentives to take steps that might have offset the need to curtail in the first place. This inherent obstacle in Brazil's price cap model might have been overcome if the license had externally imposed energy efficiency criteria. However, BNDES was unwilling to impose anything more than a minimal commitment for what it viewed as a social burden in the initial licenses, so the efficiency standard was set at 1% of revenues. If BNDES had been interested in efficiency but did not want to impose an explicit social burden in the license, it might have considered using a revenue cap model in which the distributor is allowed to recover up to a specified amount of revenue regardless of throughput. The distributor's financial self-interest is thus tied to the most efficient use of energy. It becomes indifferent to whether it buys energy for its customers or provides end-use efficiency. Self-interest would dictate that a distributor selects the less expensive option. Another option, rate of return, which would have allowed regulators more discretion in overseeing the allocation of utility expenditures, could have been utilized to incentivize more spending on efficiency, but this model was rejected for reasons having nothing to do with efficiency.

The absence of an effective spot market in Brazil which would provide customers with clear price signals to efficiently manage provided no margins for an energy services sector to emerge, nor incentives for distributors to promote efficiency. Although, some use of demand-side bidding by industrial customers has occurred during the shortage, no formal mechanism to enable demand-side bidding to compete with supply-side options was ever created. While that deficiency is not unique to the Brazilian market, the absence of an effective spot market makes it virtually impossible to allow competition between supply and demand.

Today's shortages have had one positive effect. which Consumers have become far more conscious of the benefits of energy efficiency. Much of this is due to extensive media coverage. Still, there have been glitches. The demand, for example, for high efficiency lamps became so great in relation to the supply that a virtual black market was created. ANEEL had ordered distributors to devote a larger part of the 1% funding to promoting high efficiency street lighting and to distributing high efficiency lamps to low-

income households. Given the diversion of a larger portion of the 1% funding into research and development, the absence of any effort to revise utility incentives, and the lack of meaningful price signals, it is not clear that the raised public awareness will have a sustained impact.

The use of renewables in restructuring, until recently, has been not much different. Within Brazil, there is a strong NGO network that supports renewables. Those groups have, in recent years, received considerable support from multi-lateral lenders and bilateral donors. PRODEEM also provided financial support for pilot programs to use renewable resources for rural electrification. The CCC program that subsidizes the transport of oil-derived fuel to remote, isolated generators was modified to provide incentives to replace diesel generators with small hydro units.

Until quite recently no spending requirement or portfolio standard was imposed on distributors. The Normative Value (VN) established by ANEEL to indicate the level of capacity payments distributors incurred in purchasing electricity could automatically be passed through to consumers, and may well have created a barrier to purchasing power from renewable sources. Although there have been indications that ANEEL might incorporate sufficient flexibility into the VN to accommodate the higher costs of developing renewable projects, potential renewable energy providers still contend that the VN is too low to allow them to compete effectively. They argue that the VN actually discourages distributors from buying renewable energy because of the risk of non-recovery. A broad energy bill pending in Congress includes a requirement that distributors purchase no less than 10% of the energy needed to meet new demand for the next decade from renewable sources. There is a possibility that the renewables section may be voted on separately, with the hope that its severance from other, more controversial measures, will facilitate passage.

ANEEL has also offered to reduce the threshold for attaining “free customer” status from 3 MW to 500 KW for customers using small hydro. ANEEL has recently approved 23 new wind parks, 100 new small hydro facilities, and a number of new biomass units. If these recent developments are any indication, there is certainly reason to be optimistic that renewables will find their way into the internal operations of the electricity market. Meanwhile, the CGC has mandated that Eletrobras purchase 1.2 GW each from wind, biomass, and small hydro sources in the next three years. The implementation of the mandate, however, has been delayed because of disputes over pricing.

Privatization did force a major change in the environmental regulation of the electric sector. Under the old regime, Eletrobras established technical guidelines for handling the environmental impact of new projects. In cooperation with DNAEE, it conducted technical reviews before submissions were made to the environmental licensing agencies. Now that Eletrobras is no longer developing projects, environmental reviews are entirely conducted by neutral, non self-interested agencies. The bad news is that the technical burdens of review shifted to agencies with limited capacity. There is confusion, too, about which agencies and jurisdictions will perform licensing and oversight and it is not clear how the changes will be implemented. The fact that environmental review will be

triggered by an application for a permit for a specific project make it very likely that future environmental reviews will have narrower focuses than those done in the past. Perhaps more public involvement will maintain a focus on the larger environmental picture, despite a national shortage which requires the construction of many new projects quickly.

Although urban electricity services are almost universal, rural services have been deficient. The World Bank estimates that between 2-4 million households (10-20 million people) lack electricity. Not surprisingly, those households were predominantly low income (the World Bank estimates that 73% fall into the bottom of that category). The correlation between income level and electric service in rural Brazil is very high.

Brazil has never really established a coordinated program for rural electrification. The job nominally falls within the jurisdiction of the Ministry of Agriculture, but most electrification programs are operated by MME, state governments, or the utilities themselves. In 1996 Congress tried to address the issue by passing Law 9.427 which required distribution concessionaires to bear the costs incurred in expanding service to un-served rural areas while precluding them from passing those costs to their customers. Like so many other efforts to internalize social costs, the law was never implemented, and the old system under which benefiting customers were required to pay 90% of the connection costs, was perpetuated.

Licenses could have been a vehicle to internalize electrification costs, but none established clear targets or deadlines for compliance. COELBA, Bahia's distribution company, is typical. When the state government privatized COELBA, it had three options regarding service expansion. It could grant the successful bidder a monopoly license to serve the entire state with no stated obligations for expanding service, other than that for which funds were specifically provided. a second option was to create a statewide monopoly with targets and deadlines for the provision of rural service. The third was granting a monopoly license to serve areas with service, and then to open up un-served areas to competitive solicitation. The Bahia government chose the first option because it provided the most value to the successful bidder and was more likely to attract the highest price. Within months of granting the license, a dispute erupted between the state government and the concessionaire. The government demanded that service expansion commence. The licensee, not surprisingly, indicated that the obligation to expand rural service was a condition of the license for which it bid. Unless funds were provided, the company argued it had no obligation to electrify un-served areas in Bahia.¹²

Internalizing such costs does create a cross subsidy that is best avoided. Nonetheless, the critical decisions were not made in the context of eliminating cross subsidies, which were rife in Brazil, but in the context of writing a license. Indeed, as is pointed out elsewhere in this paper, using cross subsidies to fund rural electrification is a concern of both legislators and regulators at the present time. Moreover, none of the subsidy calculations accounts for the social, economic, and even environmental costs of

¹² The episode was related to the author in a series of conversations with state energy officials, NGO's, and post-privatization COELBA personnel.

continuing deny electric services to rural households. It might have been more efficient to include rural electrification requirements in the licenses instead of designing cross subsidies later on.

At present, both ANEEL and the Congress are considering the imposition of mandatory connection targets for distribution companies that will result in universal service within a decade. Consideration is also being given to implementing added incentives to use renewable resources to meet rural electrification goals. The latter will have to account for post-installation maintenance, something that was problematic in past uses of renewables to provide rural service. The costs of all of these would be socialized across the entire system.

Designing special rates for low-income households followed the same pattern of avoiding even the appearance of social costs in the initial licenses on which investors bid. Rather than developing uniform and efficient standards for low-income subsidies, each concessionaire was at liberty to fashion its own. The result is a potpourri of subsidies whose efficiency is almost impossible to measure. ANEEL's analysis indicated that the number of customers being served on low-income rates bears virtually no correlation to the actual number of low-income persons in the state being served. Even more remarkable is the fact that some concessionaires contend, despite the fact that approximately one of every four Brazilians lives in poverty, that they can find no customers who are eligible for low-income tariffs. While the old system of using discounts pegged to consumption may have had its flaws, it was more reliable and more efficient than the current regime. The haphazard subsidies in place may be unable to cope with the substantial rate increases expected in the future.

CONSUMER PERSPECTIVES ON RESTRUCTURING

Understandably, consumers throughout the country are unhappy with the current situation. They have been required to curtail their energy use by 20%. Consumers and some state government officials in the far south resent being compelled to curtail their usage, because their region has no capacity shortfall. There is suspicion in the south and southeast that northeasterners are not assuming their fair share of the curtailment burden. Northeasterners say it's unfair to blame them since their baseline consumption is lower than in the wealthier south and southeast regions. Many Brazilians see a link between supply shortages and privatization. Some even call for the re-nationalization of the electric industry.

Consumer unhappiness goes back to the earliest days of privatization when sustained blackouts occurred in Rio de Janeiro within a year of the sale of the state's utilities to private investors. The service quality problems experienced by Cariocas were not completely unique: similar events occurred in Sao Paulo and in the areas surrounding Rio that are served by CERJ. Rio, however, undoubtedly shaped public opinion about the privatization of the power sector. The blackouts created the impression that privatization would lead to deterioration in service quality. While such an impression may not be

justified on a general basis, the underlying causes and the aftermath were almost directly linked to in the implementation of privatization. Although ESCELSA was the first distribution privatization chronologically, LIGHT was the first in which a major effort was made to attract investment from abroad. Prior to opening the formal bid process BNDES talked with key figures in capital market centers in Europe and North America to learn what investors were looking for. The bankers were aware that they needed to make the LIGHT offer attractive enough to motivate bidders. The investor friendly elements that subsequently led to service problems were: the treatment of productivity gains; a lengthy initial rate period; the lack of service quality mandates, and the fact that the license was being issued prior to implementing an effective regulatory regime.

The pricing regime was, with two very significant differences, a price cap regime similar to that being used in England and Wales. The differences, however, are critical to understanding what happened in Rio. In England, the distributors were under the famous RPI-X formula, under which a benchmark, rooted in costs, is established. For a stated period of time, 5 years in England those caps stay in place with automatic annual adjustments to reflect inflation. At the end of the period, the entire process is repeated and caps put in place for the next 5-year period. Those caps, however, were also subject to the annual X factor adjustment. X reflects the portion of the expected level of productivity gain per year to be returned to customers. The incentive is both carrot and stick. The stick is that X goes back to the consumer whether or not the productivity target is attained. The carrot is that investors keep all productivity gains above X. For Rio Light, however, it was decided to use RPI with no X factor and to leave the regime in place for a period of seven years. The rationale for deviating from the English model was that Brazil was viewed in capital markets as riskier than England and that the elimination of the X factor strengthened the incentives for improvements in productivity because all savings in the first 7 years went directly to the company's bottom line. Some even argued that an X factor was a form of confiscation. The use of a 7 rather than 5-year term for the rates was justified on the grounds that the longer period was to add a level of certainty to investors.¹³

A consortium of three foreign investors led by Electricite de France was the successful bidder. BNDES was a principal financier of the transaction.¹⁴ At the time of privatization, LIGHT had suffered from under investment and much of its equipment had deteriorated. The workforce, however, was skilled in maintaining and operating the system, but LIGHT's new owners sought to reduce costs by removing the more senior, higher-paid personnel from the payroll. Having already invested a substantial capital to purchase LIGHT, they did not rush into making plant improvements.

The absence of an X factor, the absence of performance standards, the lack of regulatory oversight, and the lengthy initial rate period, effectively meant that there was no disincentive to merely cutting costs, as opposed to boosting productivity. Price caps themselves do not distinguish between cutting costs and increasing productivity. Since

¹³ The thinking on the LIGHT pricing was relayed to the author in a series of conversations with officials of BNDES, economists, and power sector personnel.

¹⁴ Describing the LIGHT transaction as "privatization" is ironic. A state owned company, Electricite de France, is a principal buyer of another state owned company, LIGHT, in a transaction financed by BNDES, a state owned bank.

the rates were not subject to review for seven years, there was no urgency for investors to make improvements. Almost a year after private management took over, a record heat wave caused demand to skyrocket, and old transformers went down and caused much of Rio to be blacked out. Veteran workers who knew best how to operate the system had been let go, so there were not enough skilled personnel to return the system to service in a reasonable time frame. Customers were outraged and demanded redress. Where would redress come from? ANEEL had come into existence literally one week before the blackouts and was understaffed to handle the crisis. ANEEL's legal authority over a licensee whose license pre-existed the agency's creation was questionable. Perhaps even more troubling, there were no service quality rules in place governing the company's performance. Ultimately, LIGHT was compelled to pay a fine and to improve its operations. Nonetheless, public impression had been made and it left many consumers cynical about privatization.¹⁵

Today's shortage is neither short-term nor a local problem, but is national in scope. Brazil needs to quickly add substantial generating capacity and become more efficient in the use of energy. It must reduce its dependence on hydro resources if it wishes to avoid the adverse consequences of its periodic droughts and environmental consequences of large scale hydro construction.. That effort requires substantial capital that will ultimately result in higher rates for consumers. Estimates of anticipated rate increases range from 33-to 50%. It is not at all surprising, therefore, that many consumers have come to associate privatization with shortage, high prices, and poor service.

INVESTOR PERSPECTIVES ON RESTRUCTURING

For a variety of reasons, mostly linked to currency risks and rationing, most investors in the distribution sector are looking at red ink in Brazil. In the generation sector, the story has been the lack of investment. In the distribution sector, many investors have not fared well either. .

The financial losses experienced by distributors are largely derived from being required to bear the risks associated with uncontrollable costs, namely currency fluctuations and loss of throughput due to rationing. The first was caused by what investors came to see, perhaps not fairly, as deficiencies in regulation. The second resulted from the inability of distributors to enforce Annex V of their contracts with generators, which, as noted earlier, entitled them to compensation for loss of throughput in the event of mandatory curtailment of use. Both of these problems are intrinsic to the way that the distribution companies were privatized.

Investors' problems were exacerbated by having to pay for equipment and fuel costs in hard currency. When the Real was devalued and allowed to float, distributors began to hemorrhage money. Not surprisingly, they sought relief from ANEEL in the form of indexing their tariffs to the U.S. dollar. The regulatory reasons for denying the requested

¹⁵ The author conducted a number of interviews with a variety of company officials, regulators, lawyers, NGO's and others regarding public reaction to LIGHT's service quality problems.

relief were that the licenses did not bestow any protection from currency risk, that private investors were in a better position than consumers to effectively hedge currency risks, and because of a belief that the distributors should not expect to avoid the currency risks their customers had to bear. Many, suspected that the real reason for denial of relief was political. Allowing tariffs to be dollar-denominated would constitute a major embarrassment to Cardoso's government.

The Annex V issue is more complicated. Privatization began with the distribution sector in order to provide a commercially viable way of creating reliable revenue streams for the generators. Once the distribution companies were commercially viable, they would become creditworthy buyers whose commitments to buy energy would entice more investors into the generation sector. Indeed, the market rules were written to require distributors to sign long-term contracts for 100% of their load. The value of those contracts was reinforced when Gerasul was put out to bid and potential buyers engaging in due diligence asked what assurances of a post-privatization revenue stream they would receive. Almost immediately, the distribution customers of Gerasul were handed long-term contracts with the generating company and instructed to sign. These contracts facilitated the sale of Gerasul. From the standpoint of the distribution companies, the signing of the contracts was only problematic if there was a risk of not recovering the costs. In the event of rationing, Annex V guaranteed that generators would compensate distributors for the contracted energy for which there was no need. The clause had two clear effects. The first was, as noted above, that generators had the responsibility of guaranteeing energy supply. The second was, because most of the generating sector was still state owned, Annex V liabilities were being assumed by the government. Although that added risk, arguably, might have dampened the enthusiasm of private investors for putting their capital at risk in the generation business, few people foresaw the need for rationing. There was, therefore, little concern about the added risk for generators.

Interestingly, and prophetically, many in the industry were convinced that in the event of rationing, Annex V would never be enforced. When rationing did occur the provisions of the clause were not enforced and distributors suffered major losses as a result of reduced throughput. Interestingly, the proposed solution to the Annex V controversy, discussed in the next section, restored the losses suffered by the distributors, but without acknowledgement of contractual obligations.

While private investors in distribution were losing money, investors were simply staying out of the generation business. Although, as noted earlier, 23% of the generating sector is in private hands, the number is a little misleading. Gerasul, alone, accounts for about 5% of the installed capacity in the country. When one adds in the generation owned by privatized distribution companies and co-generation, the 23% figure looks less impressive. There were few incentives for investors to involve themselves in generating electricity and a number of disincentives for doing so.

Investment disincentives were numerous. From the onset of privatization, private investors in thermal generation had been wary of trying to compete with the large hydro units because of the marginal cost of water, and the fact that state-owned companies held

unfair advantages in the market. To alleviate the second concern the government proposed to privatize the four large generating companies of Eletrobras. Privatizing only one did little to calm investors' fears. When the state-owned generators also appeared to control the system operator and the model used to ascertain the opportunity cost of water systematically underestimated its value, even the most intrepid investors were wary.¹⁶

Investors interested in thermal generation were caught between a fuel market requiring long-term, take or pay contracts with payment in dollars, and the likelihood that they would have to sell peaking energy with receipts. There was neither a spot market for the natural gas nor a secondary market for pipeline capacity. Although there were some gas market niches for investors to consider, Petrobras retained its monopoly position. Not only that, it was moving into the electricity generation business. Suffice it to say, investors did not line up to build thermal units in such a regime.

Although all generators had transmission access rights, as a practical matter, access was limited. Because of constraints on the grid, there were several sub-markets, rather than a single national market. A further complication is that regional variations in rainfall often caused the seasonal re-configuration of the sub-markets. The balkanization of the marketplace has not been helped by a transmission-pricing regime that failed to reflect locational marginal costs. That, problem hopefully, will be corrected by proposed new rules governing transmission pricing.

A fourth disincentive was the confusion about market rules because MAE was never able to break the deadlock between various stakeholders, most of whom were represented on its Board of Directors. Coupled with the suspicion that ONS biased its dispatch order in favor of hydro, investors found the electricity market opaque and forbidding.

As much as Government asserted that it had conquered Brazil's chronic inflation, not everyone was a believer. Although the laws of supply and demand suggest that when supply is short, prices will rise, few Brazilians were convinced that the regulators would allow that to occur, for fear of inflationary pressures. There were also fears about Third World economic contagion. Brazil had, after all, been affected adversely by economic turmoil in Indonesia and Mexico, and foreign investors especially, feared a recurrence.

The financial circumstances of the distribution sector also caused apprehension. Revenue from energy sales to distributors was literally the lifeblood of generating companies. As those companies began losing money, generators were less certain that they would be paid for their energy. Secondly, the Annex V liabilities assumed by generators, began, as reservoirs declined, to look more and more real. Although there was widespread skepticism of their enforceability, few investors were anxious to be the guinea pigs that discovered if the provisions would be enforced. That fear was compounded by the fact that the reason for the cynicism was that the provisions would not be enforced against state owned companies. Private companies, perhaps, were another matter.

¹⁶ The author has been present in a number of meetings and conferences where potential private investors in generation have expressed these sentiments.

THE GOVERNMENT'S RESPONSE

The full scope of the government's response to the problem in the electricity sector is still unfolding. Through the end of 2001, the response, largely *ad hoc* in nature, revealed a mindset that was still strongly focused on the federal balance sheet, trusting more to command and control and socialization of risks than to market. Three examples exemplify this mindset.

The first example is how the Annex V controversy is being resolved. Given that most of the liabilities were incurred by state-owned generating companies, Cardoso's administration was not very interested in seeing the contracts enforced, because it would be counterproductive to the established fiscal policy of controlling spending. Nonetheless, the case for distribution companies to receive compensation for losses suffered because of rationing appeared compelling. The solution proposed was to securitize at least 80% of the lost revenue with a loan from BNDES. In order to repay the loan, which would show up as an asset on the government's balance sheet, distributors would be permitted to raise rates to levels that would produce the required revenues. In short, rather than treating Annex V as a commercial dispute, and then match the costs with the sources of liability, the government decided to compel consumers to pay for their own curtailment. In essence consumers were assigned, *ex post facto* take or pay obligations and penalized customers for doing their civic duty by conserving energy. This solution satisfied both the distributors and the government owned generators, but appears both adverse to market development, and unfair to consumers..

The second example is the asymmetry between the gas and electric markets. Again, the government's proposed solution was simple. Petrobras would become a partner to private investors by providing capital for thermal plant development and by assuming a part of the currency risk associated with fuel procurement. At one point Petrobras was a principal investor in 11 of 13 thermal plants under construction. The effect of the arrangement, of course, drove private suppliers of fuel out of the market and reinforced Petrobras' monopoly power in natural gas. Surely no private fuel supplier would willingly assume the risks Petrobras took on.

The effect of the Government's early actions in response to the crisis was to socialize both risk and means of production in order to entice private investment. A monopoly player in one energy market became a dominant player in another. The strategy was effective, in the sense that it stimulated the construction of thermal plants that might otherwise have not been built, but in policy terms, monopolies were being reinforced in the name of liberalization, while risks were being socialized in the name of privatization.

The Government, once it fully grasped the scope of the supply crisis, responded by mandating 20% reductions in consumption. Despite controversies over what many viewed as a Draconian response, the effort proved successful in the sense that blackouts were generally averted and a great deal of energy conservation was attained without excessive damage to the economy as a whole.

Very recently, the CGC has taken steps which indicate a much more sweeping response to the sector's problems. Many of the measure either being undertaken or proposed, have a direct impact on the problems discussed above. They address both the market and social issues discussed above.

CGC has disbanded MAE and turned over the market function to ANEEL. Clearly, the hope is that the deadlock which has impeded market evolution, will be broken. If ANEEL is able to fulfill its new mandate in market making, the evolution of a spot market will enable customers to see real time price signals and will provide all players in the market with better information and more options. The beneficial aspects of the spot market, however, could be limited by a proposal to require generators to sell 95% of their output in long-term contracts.¹⁷ CGC's hope is that the long-term contracts will reduce price volatility. That calculation may well be correct, but it will be at the cost of sacrificing price signals that might stimulate energy and economic efficiency. Since the 95% requirement is a proposal, the issues surrounding it are likely to be the subject of extensive debate. Also proposed are provisions to stimulate contracts for thermal reserve capacity.

The program will also segregate "old energy," the state owned hydro generators, from the rest of the market. That measure should have at least two beneficial effects. The first is that it allows the government to abandon its politically and technically problematic promise to privatize facilities. The second is that it should alleviate private investor fears of being unable to compete with state owned hydro plants.

There are several other initiatives offered to facilitate thermal plant development. Subsidies on the importation of Bolivian natural gas are being proposed. The dispatch order is being modified to make certain that thermal plants are dispatched, even if out of economic order, whenever the security of supply is at stake. The old cost-based system of establishing the order of dispatch, calculations distrusted by many private thermal generators, is being replaced by a new system. There is also a proposal to change the governance of ONS to assure its independence of any market participants. The new regime will be based not on costs, but rather on actual bids. Complementing these measures is a proposal to implement location sensitive, nodal pricing for transmission. It is hoped that the new pricing will have the effect of strengthening interconnections so generators will have access to larger market in which to sell.

The recent announcements also address many of the social and environmental issues. There will be new incentives to promote the development of renewable resources. New incentives may include resource-specific VN's that will reduce, if not eliminate, the risk of non-recovery for distribution companies buying renewable energy. Such an incentive is part of an overall proposal to make the VN calculations more flexible. The obligation for providing universal service, especially in rural areas, will be placed squarely on the distributors. Mechanisms will be created for distribution companies to recover, in tariffs, the costs incurred in expanding service.

¹⁷ The previous requirement for generators to sell long term was 85%.

CONCLUSION

It is difficult to avoid concluding that the Brazilian electricity sector experience over the last decade was really about government accounting.. Privatization was all about maximizing revenues in the short run, not optimizing the power sector over the long run. The federal government avoided addressing crucial social and environmental issues by missing many opportunities to make positive changes in the quality of people's lives. Privatization transferred capital and liabilities, but did so without liberalization, without market development, and without improving overall efficiency.

The new proposals by CGC do offer some reason for optimism. Taken as a whole, they would appear to be an odd mix of both command and control and market oriented measures. That lack of consistency may be explained by three lessons that appear to have been learned. The first is that someone has to manage the transition. In the short run, the government may be the only option. The second lesson is that privatization works best in the context of a viable market; carefully designing that market is a crucial task that must be undertaken. The third lesson is simply that social and environmental impacts are an inherent part of electric restructuring and cannot be swept under the rug.