

Report of ANEEL's Distribution Tariff Reform

Paul M. Sotkiewicz
Public Utility Research Center, University of Florida
October 30, 2000

Preface

This report stems from ANEEL's request to the Public Utility Research Center at the University of Florida to provide technical assistance and expertise to aid ANEEL in its endeavor to reform tariffs for newly privatized electric distribution companies. At the request of ANEEL, PURC sent its Director of Energy Studies, Paul Sotkiewicz, to Brasilia to participate in a two-day public seminar on incentive regulation and tariff reform on October 2-3, 2000. Additionally, Mr. Sotkiewicz engaged in internal discussions with ANEEL staff, and experts from Brazil and the United Kingdom on October 4-5, 2000 to help ANEEL staff to formulate its new tariff policy.

As a part of its role in the process, PURC and Mr. Sotkiewicz were asked to deliver a report offering analysis and recommendations to ANEEL on several aspects of ANEEL's proposed tariff reform. The tariff reforms are outlined in a Technical Note issued September 11, 2000, and were discussed on October 2-5, 2000 in Brasilia. The report is not meant to offer specific and concrete recommendations, for such decisions are best left to ANEEL staff and Directors. However, the report is designed to offer broad analysis and recommendations based upon the experience of PURC staff and known best practices for regulation. In addition, many of the ideas based upon best practices have been presented to ANEEL in a compilation of presentations and papers during the week of October 2-5, 2000.

Introduction

Like many of its neighbors in the Western Hemisphere, Brazil has started restructuring its electricity industry. Following the restructuring patterns of countries such as Argentina and Chile, Brazil has unbundled the generation part of the sector from transmission, and has provided for open access to transmission and distribution systems that will facilitate competition on the generation side of the industry.

As a part of the restructuring, a new regulatory body, Agencia Nacional de Energia Eletrica (ANEEL) has been created to implement and oversee electricity sector restructuring. ANEEL's specific responsibilities include price regulation, competitive behavior, technical regulation, and concessions. Currently ANEEL is in the process of revising tariffs for distribution concessions that it has awarded, and continues to regulate. In the drive toward privatization and a new regulatory regime for distribution concessions, ANEEL wants to ensure that its regulatory policies will promote broad goals. These goals include economic efficiency, the allocation of risks in a more coherent fashion, have clear and predictable outcomes for the electricity industry, and take into account the social and regional differences that exist in a country the size of Brazil. More specifically, ANEEL is seeking regulatory policy that adequately compensates the private holders of the distribution concessions, yet provides the proper incentives to the concession holders to keep costs down, improve productivity, provide quality services, and grow to extend service to areas that may not yet have electricity service. Moreover, ANEEL is looking to open up retail electricity sales to competition in 2003 and to allow all consumers to have a choice of supplier by 2005.

As a part of this process, ANEEL is conducting open, public hearings in which it hopes to provide a free flow of information for all interested parties. It is hoped that such an open exchange of ideas and concerns will lead to a regulatory regime that is acceptable to all stakeholders, and that such a regulatory regime will minimize the amount of regulatory uncertainty and promote transparency in regulatory rates and reviews.

In order to achieve the goals stated above, ANEEL has proposed, and begun to implement a performance-based regulation (PBR) regime known as price cap regulation (PCR). In theory, price cap regulation does not require a review of allowed revenues as frequently, thus allowing the utility company to capture some of the benefits of cost reductions and productivity improvements during the extended regulatory lag. The PCR regime differs from the traditional rate of return (ROR) regulatory regime in that under ROR regulation, such costs savings and productivity gains are quickly passed through to consumers. Thus, ROR regulation leaves the utility with little incentive to keep costs down, or to seek innovations that will lead to productivity gains. In addition to the PCR mechanism, ANEEL also proposes to implement a system of rewards and penalties, separate from the PCR mechanism, for meeting certain quality of service goals.

Unfortunately, implementing PBR mechanisms like PCR are not easy. There are a host of issues that must be addressed so that the PBR regime can be effective in achieving the broad and specific goals stated by ANEEL. Among the issues that need to be addressed are the cost of capital, the determination of the portion of productivity gains and cost savings that will be passed on to consumers known as the X factor, and the process by which tariff revisions and adjustments will be made.

This report will address PBR and PCR mechanisms in general, and will focus on issues related to the cost of capital, tariff revisions and adjustments, and determination of the X factor.

General Overview

In the process of reforming distribution tariffs, ANEEL wishes to make the new transmission tariffs, and subsequent reviews, as transparent as possible. In this way ANEEL hopes to minimize the amount of regulatory uncertainty as much as possible. One way in which to achieve this goal is to make as many elements of the tariff as formulaic and rigid as possible, especially with respect to the setting of the cost of capital, valuing the rate base, and the X-factor for price revisions. Additionally, all the numbers needed to implement the formulae will be determined in advance. Certainly, if it is possible, such a formulaic presentation of the distribution tariff will alleviate much of

the regulatory uncertainty for both investors and consumers. Moreover, such a regime will make rate revisions much easier over time and will minimize the amount of staff resources needed to conduct price revisions in the future.

However, such rigid formulaic approach does have disadvantages. Formulae alone are not necessarily bad. However, the apparent desire to determine the numbers to be used in advance can have serious consequences. The choice of numbers such as beta, the rate of return, or the X-factor at one point in time will not necessarily reflect market conditions at the time of the rate review. There is also the potential for events to take place that cannot be foreseen by either the regulator, or the investors, which could make certain formulae or numbers obsolete. So while regulatory uncertainty is minimized, other risks in the market could very well be magnified by such rigidity.

The timetable for finalizing the tariff revision process as embodied in a final rule is also crucial. ANEEL has expectations that a final rule should be issued in early December of 2000. This accelerated pace means that many decisions on how tariff revisions will take place, the methods by which numbers will be calculated, and many of the numbers themselves will have to be in place in approximately three months from the time of the issuance of the technical note. This goal is admirable and indicates the gravity that ANEEL places upon getting the tariff revision process in place. But, perhaps the time allotted to issuing a final rule is not enough.

Many of the issues that are being addressed by the technical note are complex. The methods for, and determination of, the cost of capital, the X-factors, the rates of return, and the risk factors (betas) for all distribution companies is daunting and require careful thought. Add into this complexity the need for ANEEL to conduct public hearings to gather perspectives from consumer and investors groups, and the time needed to address the concerns of the various interest groups, and the timeframe desired by ANEEL for issuing the final rule seems quite rushed. Compared to rulemaking in the United Kingdom and the United States, the time set aside for issuing a final rule does not seem adequate. Moreover, if in this short timeframe, certain interest groups do not feel as if their concerns have been adequately address, the laws in Brazil do not allow for those parties to request a rehearing at ANEEL of the contested aspects of the regulatory rule. Instead, parties contesting parts of the tariff revision rule will take the issue to the legal

system, which could tie up implementation of the rule. Or the courts themselves could unilaterally change what ANEEL is trying to do.¹

In summary, ANEEL's drive toward tariff reform through the issuance of its technical note and public hearing process is sound and well focussed. The openness will enhance transparency and help reduce regulatory uncertainty. However, as ANEEL progresses along toward the final rule on distribution tariffs, it should keep in mind that while a formulaic approach can also reduce regulatory uncertainty, it can lock ANEEL into policies with little flexibility to the changing economic, regulatory, and political environment. Moreover, the time allocated to making decisions about complex issues surrounding privatization and performance based regulation is quite short, and may not allow for as much careful thought as ANEEL may desire. The short time period for consideration of the issues along with the potential inflexibility of a formulaic policy, may raise the risk of legal challenges to ANEEL's policies and could ultimately lead to the courts making decisions for ANEEL which creates more uncertainty for investors.

ANEEL's General Proposal for Tariff Revisions

ANEEL employs PBR in the form of a hybrid PCR to its distribution utilities with the tariffs being readjusted annually according to the RPI – X formulation. Specifically the annual tariff readjustment is equal to

$$IRT = \frac{VPA_1 + VPB_0 * (IGPM - X)}{RA_0}$$

Where VPA_1 is the costs that the utility cannot control, such as the cost of purchased power, and VPB_0 are the costs under the control of the utility, $IGPM$ is the measure of inflation, and RA_0 is the overall revenue of the utility. In this formulation, VPA_1 is passed through to consumers, while only a portion of the costs controlled by the firm are passed through to consumers.

¹ This is not to say that a longer timeframe will avoid legal challenges. It will simply minimize the potential

Every 3-5 years ANEEL will revise the distribution tariffs as needed in order to reflect changing expectations about the value of X and any changes that may be required to the cost of capital. Moreover, ANEEL will consider, as needed, the possibility for tariff revisions to unanticipated events or cost changes that could threaten the financial viability of the distribution concession (extraordinary tariff revisions). Such unanticipated events could include major shifts in economic policy or natural disasters. In conducting such revisions, ANEEL will establish a test year so that the rate base (value of capital), return on rate base (cost of capital), and the appropriate level of operation and maintenance expenses. Moreover, the revision process will also evaluate the concessionaire's non-concession activities to ensure that captive customers are not subsidizing the regulated business, and the revision will consider how allocate revenue requirements to particular customer classes.

Finally, ANEEL proposes to include specific service quality standards so that service quality does not decrease in response to cost cutting measures the distribution utility may undertake in response to PCR. If such standards are not met, then the distribution concessionaire will incur financial penalties.

Analysis and Recommendations

Cost Pass-Through and Unbundling

One of the biggest issues that have arisen in the context of PCR is the potential for unbundling of generation from transmission and distribution. To fully appreciate the potential incentives and gains from employing PCR, it seems a bit odd that the cost of energy purchases will be completely passed through to customers. Generally speaking, the cost of energy itself makes up approximately 80% to 95% of the final customers' bills in the United States, and distribution services make up the remainder of the cost.² To fully realize the potential efficiency gains from PCR regulation, perhaps the costs of purchased power should be open to price cap regulation as well. To not include the

for any legal challenges to the new rule.

² The costs associated with the distribution service will vary by concessionaire due to the spatial dimension of the customers served. For example, in rural areas, the number of customers per mile served is less, leading to wire costs being larger, whereas in urban areas, the wire costs will be smaller for each customer.

largest cost to end-consumers in the PCR regime, makes the regime proposed in the technical note appear more like a traditional cost of service regime where customers take on all of the risk, than a PCR regime where risks are shared.

This is a difficult question for ANEEL to address. Currently, it seems distribution concessions must purchase a portion of its power from more expensive natural gas fired power plants in addition to the cheap hydro-power that is available in Brazil. Clearly there is considerable price risk involved in purchasing power. This risk includes the possibility of drought, which limits hydropower resources, and the world price of natural gas, which influences the price of power from gas, fired units. It seems that given the separation of supply and distribution functions contemplated by ANEEL, and the coming regime of retail competition, it would be a good idea to get distribution companies accustomed to hedging strategies in the purchase of power.

If ANEEL chooses to subject purchased power to a price cap regime, another question that must be addressed is whether one X-factor will be applied to both the distribution service and purchased power, or whether separate X-factors will be employed. Ideally, since the wires business will be separated from the power supply business, separate X-factors should be set for the distribution (wires) and for power supply. This will undoubtedly place an extra burden on ANEEL staff to come up with separate X-factors for each part of the business. However, in order to capture all of the potential gains from PCR, and to prepare firms for competition in 2003, this seems to be a reasonable course of action.

Another issue that arises in the unbundling of services, and that was not discussed at length, is the potential for cross-subsidies between the power supply portion of the distribution concession, and the wires part of the concession. In the immediate future, such concerns need to be addressed so that excess power purchase costs are not included as costs in the wires part of the business. Looking toward 2003, the separation must be complete. One way in which to achieve this, other than accounting measures, is through the use of codes of conduct. Codes of conduct are important for ensuring fair and open access to distribution wires for potential suppliers. Such codes should be set up so that the power supply part of the business is not able to communicate with the wires part of the business, unless such communications are out in the open. If the two parts of the business

are allowed to communicate only with each other, then it is possible for the supply part of the business to gain an unfair advantage in gaining customers relative to its competitors.³

Performance Measures

There are two options for the inclusion of performance measures in the PCR. One is to incorporate such performance measures directly into the calculation of the X-factor. The other is to keep separate the performance measures from the X-factor, and to create separate rewards and penalties for each performance measure. For the ease of calculation of the X-factor and penalties/rewards for meeting performance targets, it is recommended to separate the calculation of the X-factor from the performance penalties and rewards. The reason for this separation is quite simple. The X-factor is an efficiency target that the distribution concessionaire is trying to exceed so that it may capture the excess gains. In order to accomplish this, the company will attempt to cut its costs by as much as possible. One major consequence of cutting costs has been a deterioration of many of the performance measures, like service quality, that are usually considered for performance. Thus, by combining performance measures into the X-factor, it will be difficult to really determine efficiency gains since other performance measures may offset gains in cost efficiency. Separating the two measures, efficiency gains as measured by costs, and other performance measures such as service quality, allows ANEEL to easily measure efficiency gains due to reductions in costs without the mess of attempting to incorporate performance measures that are not valued directly by markets.

Setting the X-factor

Setting the X-factor is more art than science. For example, it is up ANEEL to determine the percentage of efficiency gains, as measured by costs, that the distribution concession should attain in each year of the tariff. Of course, this depends upon how

³ Similar codes of conduct are in place in the United States for wholesale market competition. Any information about the transmission system must be posted publicly on the internet or some other public electronic bulletin board. In this way, the affiliated supply company does not have an unfair information advantage that could give it a competitive advantage.

efficient the firm already is. If the concession is already quite efficient, then the X-factor will likely be quite small since any efficiency gains that can be made at this point will be quite small. However, if ANEEL feels that the distribution concessions are not very efficient to begin with, then setting a large X-factor may be more appropriate. Given this basic, common sense guidance there are other questions that need to be addressed regarding the X-factor. How does ANEEL determine the efficiency level that concessions should achieve? Should each concession have separate X-factors, or should there be only one for the entire industry? Should ANEEL include a separate “stretch factor” for investment, or should this be incorporated into X-factor?

There are two ways to determine the efficiency levels that distribution concessions should achieve. One way is to use benchmarking studies to find the most efficient firms, and use those as the benchmark for other distribution concessions. This sounds simple but can be quite complicated. For example, in the benchmarking study, are Brazilian companies compared among themselves, or do you make comparisons to distribution companies in other countries? If the benchmarking study is to concentrate only on Brazilian distribution companies, there is a risk that all of these companies are starting from the same point as they are being privatized. This will tend to underestimate the potential efficiency gains biasing the X-factor downward. These efficiency targets would be easy to hit and the distribution concession may be rewarded to handsomely for targets that are not difficult to achieve. On the other hand, using companies in the same country ensures that efficiency gains are not being targeted toward companies in other countries that have had very different experiences from companies in Brazil. If the comparison is being done for with respect to distribution in other countries, these companies may either be far less or far more efficient biasing the choice of X-factor downward or upward respectively. If the target is unrealistically high, then ANEEL runs the risk of not ensuring reasonable rates of return that could lead to calls for extraordinary tariff revisions.

The other way to determine potential efficiency gains is to build a model of a “hypothetically efficient firm”. This endeavor is difficult in that any model building require making many assumptions, any of which can be contested either by the

concessions or consumer groups if the assumptions are not favorable to either interest group. Moreover, building models can require a great deal of expertise, and staff resources and time. ANEEL seems to have the expertise, but does not seem to have the time or staff resources at its disposal.

Overall, it seems benchmarking studies would be appropriate. There are many consulting firms and government agencies around the world that collect data appropriate for benchmarking studies. But, as has been mentioned above, great caution should be taken to ensure that the distribution companies that are being used for comparison, do not differ in their operating environments too greatly from the situation in which Brazilian companies operate. As a suggestion, perhaps it would be appropriate to benchmark distribution companies in other countries that have recently undergone privatization, much like the distribution concessions in Brazil.

Once the methodology for determining the efficiency gains expected have been decided, ANEEL must turn to the question separate X-factors for each company. Certainly, having only one X-factor for the entire industry would be easier to administer, but it has problems given the differences in distribution concessions in a country the size of Brazil. Distribution companies in rural areas face different challenges than their counterparts in urban areas. Differences in number of customers per mile, the need for voltage equipment and substations, the vulnerability of the system to outages due to weather are among the differences. Given these potentially extreme differences, it would be the best course to set separate X-factors for each company. While this will take up more staff time and resources, separate X-factors will allow ANEEL to recognize the differences of each concession's operating environment, which is a major concern to ANEEL and Brazil. Additionally, when benchmarking these, it would be appropriate to look at firms of the same size and in the same conditions in other countries, as described previously.

Incorporating a separate "stretch" factor into the X-factor is also a concern. ANEEL is quite concerned that there is much new investment needed in the distribution infrastructure to help make up for years of neglect. Another possibility, and one that has

been employed in the Argentine gas industry (called a K-factor) and the UK water industry (called a Q-factor), is to introduce a separate factor to account for the needed investment. In this way, it is possible to separate out the investment needs, from the expected efficiency gains. This is relatively straightforward and allows ANEEL to account for the price set in the tariff in a more transparent manner.

Test Year

Ideally, under PBR mechanisms it would be desirable to establish a test year that is at some point in the future, usually the last year of the period for which the current revisions will be applied. The problem with using a future year as the test year is that detailed forecasts of future utility costs and economic conditions must be conducted. Such forecasting methods, in addition to being extremely data intensive, are heavily dependent upon assumptions which could be easily contested during the revision process. Ultimately, forecasts are rarely accurate, and the time and staff resources necessary to conduct “good” forecasts may not be worth the benefits.

Another possibility is to use historical data for a test year. Certainly this method does not face the same shortcomings that forecasts have in that the data are readily available and there is no forecast error. The main question that needs to be addressed in the context of using a historical test year is to use only the year prior to the tariff revision, or to use a period of two to three years before the revision. During internal discussions at ANEEL, there seemed to be a desire to use a historical test year, usually the year prior to the revision, but to look back at years previous to the test year as well for a comparison.

There is certainly good reason to account for years prior to the historical test year. As ANEEL staff has recognized, if the regulated company knows what the test year will be, it has the incentive to defer to the test year routine operation and maintenance expenses, and may even pad such expenses. The company may do this in order to gain favorable treatment of operation and maintenance expenses during the revision. Hence, it would be wise to compare expenses and economic conditions in the test year to prior years in order to guard against such strategic behavior by the distribution concession.

While it seems to be a wiser strategy to use a previous year as the test year, and despite the fact that forecasts have many drawbacks, there is nothing to prevent ANEEL

from incorporating both methods in determination of the test year. This hybrid method may be desirable if ANEEL believes that future conditions may be quite different from previous years.

Initial Rate Base Valuation and New Investment

This is perhaps one of the more contentious issues that ANEEL must address, and unfortunately it is an issue that has no clear-cut answers. There are several options that are available for valuing the rate base at privatization: the sale value, the book value, and an adjusted sale value which subtracts the “premium” paid for the concession that reflects potential non-concession activities. Another possibility is the value assets at their replacement value.

Clearly, the sale value would be an easy measure for the value of the rate base. However, many of the distribution concession may have been bought at a premium to reflect potential gains to the investors for non-concession activities. Simply taking the sale value would potentially overstate the rate base, and lead to higher prices than are necessary to serve consumers of electricity. The alternative would be to subtract this so-called premium from the sale value to arrive at the rate base. Unfortunately, there is no way to measure the premium until some time into the future. Deducting the so-called premium apparently agreeable to investors, but the actual number associated with the premium would be extremely controversial. Given the measurement problems with the premium, this does not seem satisfactory.

Another logical possibility would be to simply use the book value of the assets purchased at auction. Unfortunately for Brazil, this is problematic. Up until 1995, the book value of assets was indexed to inflation, but after 1995 this was not allowed. So the book value is understated due to the lack of inflation indexing over the last five years. Still, there still is a theoretical possibility of using a modified book value. It may be possible to go back to the date of purchase or installation of assets, and given the price level at the time, update the price to the current price level to get the “modified” book value. The problem with this possibility is that it will be extremely cumbersome to go

back and do this calculation for every asset, for every company, and given the limited time and resources of ANEEL staff, this does not seem to be a realistic possibility.

One last possibility is to use the replacement value of the assets privatized. On the surface this seems reasonable, but this method also has drawbacks. For many types of assets like transformers, the replacement value is far less than the original purchase price. For other types of assets, it is possible that the replacement value is far greater than the original purchase price. Moreover, the replacement value does not account for the financial or physical depreciation of the assets already in place. Therefore it would be reasonable to expect that the physically old assets have less value, due to lower performance, than the new replaced assets would have. Yet, valuing the old assets at the replacement value would place greater value than perhaps deserved on the old assets.

What should ANEEL do? In light of the potential problems for the other valuation methods, a suggestion is offered in the spirit of regulatory flexibility, and with the knowledge that it is highly imperfect, but practical given the circumstances. The easiest way to value the assets is to use the sale value at privatization. Knowing this likely overstates the rate base value, ANEEL could negotiate with distribution concessionaires a higher X-factor to account for this difference, or a lower “stretch” factor with the understanding that more investments than accounted for in the stretch factor will be undertaken. This is certainly a compromise, especially given ANEEL’s desire for a more formulaic approach to tariff design, but if the negotiation process is carried out in the open, the process should be transparent enough to assuage the concern of investors about regulatory uncertainty. Furthermore, any compacts made by the companies with ANEEL will be in the open, and if the company does not carry through with the commitments it makes, like for new investment above the stretch factor, then consumer groups can apply political pressure to companies to live up to their commitments.

Questions about the value of new investments are much easier to answer, since new investment does not have the same problems as valuing the rate base at privatization. Still, a problem can arise where a company may undertake new investment, yet those investments may either be overstated to inflate the rate base. Clearly, ANEEL wishes to move away from after-the-fact prudence reviews that create regulatory uncertainty. One

possible solution is to follow what the UK has done with respect to investment. ANEEL could pre-approve any investments before they are actually made. In this way, if ANEEL approves the investments up front, there is little concern that any investment will be disallowed in the future. This is in contrast to allowing distribution concessions to make investments without the knowledge of ANEEL, and then presenting ANEEL with a *fait accompli* and forcing ANEEL to place in the rate base imprudently incurred investments to preserve regulatory certainty.

O&M Expenses

The handling of operation and maintenance (O&M) expenses are quite straightforward in the proposal. The big incentives under price cap regulation are to keep these costs down as much as possible. However, service quality may suffer if the distribution company attempts to reduce its costs too much, so penalties relating to service quality may be in order to induce the company to spend the necessary money to meet service quality standards. Another potential problem is that the distribution company may attempt to inflate its costs for test year purposes, as discussed above.

In terms of determining efficient levels of O&M costs, benchmarking studies can be carried out as suggested by in the Technical Note.

Non-Concession Activities

Not unlike distribution and transmission companies around the world, ANEEL anticipates that the new owners of distribution assets in Brazil will expand their operations into non-concession activities like telecommunications.⁴ The Technical Note does a good job of making the distinction between activities that are complementary to the electricity distribution business and those activities that require the active participation by the distribution company's managers and staff.⁵ The Technical Note

⁴ In the USA and the UK, such cross-subsidy problems also exist in telecommunications, and in the power generation business. In addition to accounting rules, codes of conduct may also be necessary if the non-concession activity is the supply of power to customers.

⁵ In the context of telecommunications, a complementary activity may be the rental of poles or rights-of-way to another company for the installation of antennae or fiber-optic cable. The accounting separation for

correctly notes that any non-concession activities that require resources over and above those needed to run the concession should be accounted for separately with appropriate market based transfer prices. This has been proposed to ensure that captive customers do not shoulder the risk or costs of the company' non-concession activities.

ANEEL seems to have one potential concern for cross-subsidies addressed in principle. However, the internal seminars of October 4-5, 2000 revealed a strong desire to capture some of the revenues of the non-concession business in order to subsidize the electricity distribution concession customers. The rationale for this policy is understandable in that ANEEL desires to reduce the rates charged to customers without a decrease in service quality or harm to investors in the distribution concession. Still, from the viewpoint of economic efficiency, this policy may have unintended consequences. There is no easy answer. The ultimate decision on such a policy is up to ANEEL and policymakers from other agencies in the Brazilian government. What follows are some issues that should be contemplated before implementing this policy.

Investors in an electricity distribution concession may have invested with the idea that the infrastructure could also be easily adapted to, and economies of scope and scale exploited for, other non-concession activities such as telecommunications. One argument is that as long as captive customers of the concessionaire are not exposed to the risk of the non-concession business, investors should be allowed to exploit this other business opportunity and reap the corresponding benefits. If ANEEL chooses to expropriate some of the profits from the non-concession business, then the investors in the concession business will have less incentive to engage in entrepreneurial activities that exploit the existing infrastructure in ways that will have great benefits to society. If investors believe their risk taking will not be rewarded⁶, they will not pursue entrepreneurial activities and it may lead society to expend resources inefficiently on a separate infrastructure to expand telecommunications, when there is an existing infrastructure that could be used.

such activities is quite easy. However, if it is the case that the concessionaire's electricity employees are also engaged in the telecommunications business, then the accounting separation is more difficult. This is a situation in which ANEEL may wish to actively audit the activities for potential cross subsidies and non-standard transfer pricing policies.

⁶ It is important to note here that if captive customers do not share in any of the risk of the non-concession activity, and the regulator captures ever larger shares of the profit from non-concession activities, the investors in the concession face only downside risk in the non-concession activity.

Conversely, one could argue that it is the captive customers that in reality have paid for the existing electricity distribution infrastructure, and they have also borne all of the risk up to this point, therefore the captive customers should gain some of the benefits of the non-concession business.⁷ Neither of these arguments is “wrong”. The first argument appeals to incentives, and efficient resource allocation, while the second argument appeals to distributional equity, fairness, and a differing sense of property rights. As has been stated above, the ultimate decision on this issue is with those policymakers closest to the issues.

Finally, another idea that was discussed during the internal seminars was that of potentially reducing the rate base to account for non-concession activities. This idea has a similar appeal to that of passing along some of the profits from the non-concession activity to captive customers. However appealing this may seem, it should be approached with extreme caution.⁸ In the absence of non-concession activities it is not controversial that all of the capital assets of the distribution company, net of depreciation, should be in the rate base. Moreover, these assets are necessary for the concessionaire to carry out its task of distributing electricity to customers. Now suppose the concession holder wants to exploit the existing assets to deploy telecommunications equipment for a non-concession telecommunication business. Clearly, the telecommunications equipment should not be included in the rate base, but the fact that the assets used for electricity distribution are still needed for that purpose has not changed.⁹ Therefore, the rate base should not change.

The way to deal with this production externality has already been identified in the Technical Note through the use of transfer pricing. This method of reducing rates of captive customers has more economic appeal than the sharing of profits of the non-concession activity and still leaves many of the incentives in place for investors to engage in efficiency enhancing entrepreneurial activity. The setting of the transfer price, intuitively, should be just equal to the avoided cost of deploying the telecommunications equipment in the next best manner.

⁷ The risk borne by the ratepayers have come in the form of higher rates due to previous inefficiencies and poor service quality.

⁸ It should be noted that reducing the rate base can have the same financial outcomes as using transfer pricing, but must be figured out in advance. Thus, it is unlikely that this method will be as precise as a good transfer pricing policy.

Cost of Capital: Finding an Acceptable Rate of Return

ANEEL's Proposal

ANEEL proposes to use a weighted average cost of capital (WACC) model that includes both equity and debt where the weights on equity and debt are simply equal to their respective percentage of total capital. Under the WACC model, ANEEL wishes to establish a range of capital structures with the objective of obtaining a lower WACC for the utility. Utilities that have capital structures within the established range will have its capital structure used in computing the WACC. However, utilities that do not have capital structures within the established range must justify to ANEEL why its circumstances justify its capital structure. Moreover, for debt, ANEEL will take into account the structure of debt such as special government loans or special provisions such as warranties that use the utility's assets or revenue as collateral.

Establishment of the range of capital structures will be developed from a sample of comparable companies, regulated and unregulated, based business and risk characteristics similar to the distribution concession.

Determination of the return on capital is proposed to be done through a global capital asset pricing model (GCAPM). The GCAPM model proposed by ANEEL uses the interest rate of USA Treasury Bonds as the risk free interest rate, and the return on the stock market in the USA will be used as the market rate of return. Beta will correlate the movements of distribution utility stocks, or other related stocks to the market. Finally, the GCAPM proposed by ANEEL will also include country risk that is relevant to Brazil.

Analysis and Recommendations

ANEEL's choice of the GCAPM model is well justified in its Technical Note. Relative to the USA, Canada, and the European Union, Brazil's capital markets are still

⁹ One way to view this is that there is a positive production externality associated with distributing electricity.

in their infancy. Moreover, capital markets and economies in general are becoming more global than regional or national, so it logical to assume that many investors in the Brazilian economy, and in Brazil's electricity sector will come from abroad. Given that these investors will have other potential opportunities around the world, it makes good sense to use the GCAPM.

The choice of the interest rate on USA Treasury Bonds also seems non-controversial given that a large share of international transactions are USA dollar-denominated, and many exchange rates are pegged to the USA Dollar. ANEEL could have chosen to use interest rates on government bonds issued in Deutsche Marks, British Pounds, or Euros as many transactions are also conducted in these currencies. However, monetary policy in the United Kingdom and Germany is much more susceptible to changes in government than is monetary policy in the USA. The Euro is becoming more widely accepted as a currency, but is still relatively new and may be more risky than USA Dollar denominated assets.

The choice of the USA stock market for the market rate of return could potentially be more problematic. First, the stock market index to be used will be important. Each index has a different composition of company types, which will lead to potentially different market returns in the GCAPM. For example, using the return on the Dow-Jones Industrial Average is comprised of large, well established firms which may have lower, but more stable rates of return. In contrast, the NASDAQ index, which is heavy in high technology and internet stocks, will have more volatility and will tend to either higher or lower returns than the Dow-Jones index.

Secondly, there are other actively traded markets with indexes around the world that could be used as an alternative to the USA stock market, and may also have different rates of return compared to USA stocks. Still, given the choice of USA Treasury Bonds as the risk-free asset, choosing an USA stock market index maintains some consistency in terms of using assets from the same country. Moreover, from conversations during the public seminar, it seems that many investors in distribution assets are based in the USA,

and that by investing in Brazil, the other alternative for investment would logically be the USA.¹⁰

An issue that received little, if any, attention in the Technical Note and in conversations in during the seminars was the base period for determining the market rate of return. ANEEL must answer the following question: Will the base period be based upon the test year for the tariff revision, or will it be based upon a longer time period, perhaps corresponding to the period between revisions, or some other period? The answer to this question will greatly influence the cost of capital and the ultimate rates charged to customers. Clearly, if only the test year is used to determine the market rate of return to capital, then it could easily be the case that the rate of return is either too high or too low. However, using a much longer period, like the 5 years between revisions might give ANEEL a better idea of the trends on the cost of capital, and the choice of returns will be less susceptible to period variations.

Finally, the payback period for investments in new infrastructure must be addressed, which will define the amount of depreciation claimed each year and will greatly influence the rates charged to customers. ANEEL must take great care to balance the needs of investors buying the newly privatized assets, yet continue to recognize that distribution will continue to be regulated. Based upon the experience in the USA, it seems investors in new power projects are looking at payback periods of about seven years on new projects, as opposed to the longer payback periods of fifteen to thirty years in the old regulatory regime. However, in the case of distribution, this part of the electric power industry remains regulated and should have more stable, predictable cash flows than “merchant only” (unregulated) power plant or line projects. Given this, it does not seem unreasonable for ANEEL to require longer payback periods that are more in line with more traditional regulatory regimes. Furthermore, allowing for a longer payback period will spread the cost of distribution assets out over time, which will lead to lower rates for customers.

The choice of beta in the Technical Note does not seem to be as well defined as it could be. For example, it is not clear whether beta will be calculated using the Brazilian

¹⁰ Companies such as AES, Reliant Energy, and ENRON, despite their global presence, are based in the USA.

stock market, Bovespa, with the stocks of the distribution utilities being compared to the volatility of the Brazilian market. Or is it the case that beta will be calculated from the USA stock market with comparable companies also coming from the USA stock market. This needs to be clarified.

It would seem logical that beta be calculated from the comparison of distribution utilities or like companies to the Brazilian market. Beta calculated from the Brazilian market would accurately reflect the risk of the distribution concessions relative to other Brazilian companies, which is what ANEEL seems to desire. However, a great problem remains which is the fact that many of the distribution companies are either not publicly traded, or they are not traded in any great volume. Hence, it seems that it might be easier to look to similar companies in other countries, for which more information is available.

To calculate beta based on other markets or like companies in the USA may not accurately reflect the true risk.¹¹ For example, there are different regulatory climates in the USA and Brazil, and that alone should make the betas different. The situation is problematic. One possible course, which will take time and resources, is to study the riskiness (betas) for like companies in several different countries. One set of companies could come from countries like the USA and the UK where there are more established regulatory traditions, and another set of companies could come from countries such as Argentina and Chile that have recently privatized their electricity sector. As a comparison, ANEEL could come up with a range of betas that are possible, and hope that the range is small. If the range is small, then ANEEL can easily justify using betas based upon distribution companies in almost any country it has studied. Conversely, if the range is large, then ANEEL must make a decision on which betas would be appropriate. It would seem that if the range were large, then the more appropriate betas would be for companies that have been recently privatized.

Concluding Remarks

ANEEL has proposed an ambitious plan for restructuring its distribution tariffs. It has set a short calendar for drawing up, approving, and implementing these tariff

revisions. With the volume and complexity of issues that must be addressed, it seems that the time allotted to complete the process is too short. For comparable revisions of tariff policy in the USA or the UK, at least one year or more is needed to accomplish such a large task.

Another word of caution is necessary. While it is admirable to set forth the goal of trying to eliminate regulatory uncertainty by instituting a more formulaic, rigid tariff system, it should be noted that regulatory agencies must have the flexibility necessary to respond to changing economic, political, and technological conditions. ANEEL, in this sense, is no different than any other regulator around the world. Unforeseen events will occur that requires this flexibility.

Despite the cautions of the two paragraphs above, the Technical Note issued by ANEEL, the public meetings of October 2-3, and the internal discussions of October 4-5 indicate that ANEEL is heading very much in the right direction. The open process taken by ANEEL will go a long way toward eliminating regulatory uncertainty. ANEEL's move toward the use of PBR regimes over the traditional rate-of-return regulatory regime bodes well for ANEEL and Brazil achieving their goals for distribution companies. All that remains to be worked out are the details. With clear thinking and informed decision making, all of which has been in evidence, along with some flexibility ANEEL can achieve its regulatory goals.

¹¹ In Argentina, ENARGA S used betas calculated from the Standard and Poor's 500 index in the United States, but this hardly seems appropriate for gas companies in Argentina for a variety of reasons including different regulatory climates, or other government policies.