

# Financial Regulation of the Electricity Distributors: Necessity and Feasibility

Kesia Braga<sup>1</sup>, Carlos Rufin<sup>2</sup>, Ernani Torres<sup>3</sup>, Roberto Brandão<sup>4</sup>

<sup>1</sup>*Federal University of Rio de Janeiro, Av. Pasteur 250, Rio de Janeiro, Brazil,  
kesiabraga@gmail.com*

<sup>2</sup>*Suffolk University, 8 Ashburton Place, Boston MA02018 USA, crufin@suffolk.edu*

<sup>3</sup>*Federal University of Rio de Janeiro, Av. Pasteur 250, Rio de Janeiro, Brazil,  
ernanit@hotmail.com*

<sup>4</sup>*Federal University of Rio de Janeiro, Av. Pasteur 250, Rio de Janeiro, Brazil  
robertobrandao@gmail.com*

## ABSTRACT

Since the second half of the 1980s, when electric utilities were first privatized, the ability of the private sector to manage the supply of electricity with safety and quality has become a matter of high relevance for national governments wherever privatization has taken place. In this regard, the severe financial problems that have affected some electric utilities in different countries from time to time, have made it increasingly clear that exposure to financial risk can compromise a utility's ability to maintain service quality and continuity, and therefore that regulatory authorities should pay attention to the identification and control of utilities' financial risk exposure. This article aims to explore the factors that could contribute to the financial vulnerability of electricity distribution companies, in order to identify potential instruments for risk recognition and management. This study also proposes to examine possible regulatory policies for monitoring and addressing financial sustainability problems in these companies, a topic which has so far received scant attention in the international literature on electricity regulation. Lastly, this paper will evaluate the feasibility of regulating the financial exposure of electricity distributors.

**KEYWORDS:** Financial Regulation, Electricity Regulation, Distribution, Risk Management, Electricity Markets

## 1 INTRODUCTION

Nowadays, national regulators, experts and public entities in several countries have a growing interest in developing methodologies for economic and financial analysis of the electric distribution utilities. So far, some criteria, parameters and rules have been developed and applied to regulate the finances of the electricity sector. However, due to the high complexity of the matter, regulators are still improving their instruments and mechanisms of financial regulation. In this context, it is important to study the trends and evolution in this subject in order to contribute to the development of a highly relevant topic for regulatory policy.

The present study aims to analyze how the financial risks of the distribution segment of the electricity sector can affect operational indicators, such as the quality indexes of the services provided. The paper notes the increasing financial risk stemming from the regulatory reforms that have taken place in several countries. The recent transition from a "safe" model in terms of profitability and costs, where financial risk was largely borne by customers, to another in which the companies can incur in financial loss in a regulated environment suggests that attention to this new risky situation is needed for purposes of regulatory policy.

The financial nature of this situation suggests the use of financial supervision instruments, such as statistical models and accounting practices, that are widely used in other regulated sectors. The rate issue comes up as a central aspect, because the size of the distribution company revenues can be crucial to the success and failure of projects. Rates are the central mechanism to cover costs, ensuring the profitability of the invested capital, and enabling the quality of the operation together with the fulfilment of financial obligations.

The financial supervision of power distribution companies by regulators is a serious concern, especially in Brazil. Although there are a few recent experiences worldwide, this topic remains open to new contributions. This paper will present examples of financial regulation in the electricity sector, which can enrich the evaluation about the applicability of this policy.

This paper is divided into two main parts. The first one deals with the need for supervision of financial risk due to the transition to the price-cap model, mainly because of the financial losses it can generate for power distribution utilities. For this purpose, the paper compares the two main ratemaking models, rate-of-return and price-cap, highlighting their positive and negative aspects. In the second part, the paper analyzes the feasibility of financial supervision policy, reviewing three recent regulatory standards: that of the British regulator, the Office of Gas and Electric Markets (OFGEM), of the Ontario Energy Board (OEB) in Canada, and of the Brazilian regulator, the National Electric Energy Agency (ANEEL). The analysis focuses on the mechanisms and regulatory arrangements already developed.

## **2 RATEMAKING MODEL: IMPACT ON THE FINANCIAL RISK OF DISTRIBUTION COMPANIES**

In the electricity sector, the ratemaking model has a fundamental role to guarantee moderate prices for users and profitability for investors. The process of liberalization in the 1980s was decisive with the transition from the cost of service model to the incentive regulation model. This transition has brought considerable changes for the sector and raises lots of questions about how the ratemaking model change will affect the risks of electric power distributors.

### **2.1 Definition and Analysis: Rate of Return and Price-cap Models**

The principle of rate of return regulation, also referred as cost of service, was traditionally applied in sectors characterized by natural monopoly, such as the segment of electric power distribution, and its use was generalized through the American experience of regulation of public services.

The tariff based on the cost of service model is calculated to compensate the company for the full cost of the service, and ensure an attractive rate of return for the investor. The final tariff should cover the fixed and variable costs, including also the rate of remuneration for the investor. Another important observation is that this rate of return usually is negotiated between the two parties involved in the concession, the regulators and investors, to ensure an attractive return rate of investment for shareholders without raising excessively the final prices for the customers. This can be done through regulatory process, e.g. in the United States, or fixed by law, e.g. in Brazil.

The tariff based on the cost of service was criticized in several aspects, mainly the difficulty of determining a base value for the investment<sup>1</sup> used to calculate the total return to the shareholders, and which can be estimated in various ways. In addition, the use of “historical cost”<sup>2</sup> as an estimate for future costs is not the best approach, as a simple and general pricing practice. The problems of this method worsened in the period of hyperinflation in Brazil, where the real price of the electricity service was distorted by the application of several stabilization plans in the country<sup>3</sup>. Another motive of criticisms were the undesirable side effects on the electricity sector, especially the stimulus to inefficiency, since there is no incentive to reduce costs or improve the productivity and quality because the tariff always covers the costs and ensures an attractive remuneration rate. It is worth mentioning that the implementation of this ratemaking model also raised regulatory costs because of the great asymmetry of information between the regulated companies and the regulator<sup>4</sup>.

The regulatory model for cost of service regulation presented signals of exhaustion with the deterioration of services and disincentive to investments mentioned above<sup>5</sup>. The model’s deficiencies, in the context of economic

---

<sup>1</sup> Araújo, 2001.

<sup>2</sup> Includes the total investment effectively realized in the past (Araújo, 2001).

<sup>3</sup> Leite, 2007.

<sup>4</sup> Armstrong et.al (1994).

<sup>5</sup> As an example, we can mention the electricity crisis that occurred between 2001 and 2002, reflecting the lack of investment and mismanagement of the Brazilian electric sector planning (Cuberos, 2008).

liberalization, triggered a movement for regulatory reform of the public utilities during the 1980s and 90s. In the second half of the 90s, the Brazilian government implemented a new ratemaking model, the “law of concessions of public services (Normative Instruction 8987/1995)”, that guided the transition of the cost of service model to a price-cap model. The reforms aimed to reduce the problems of asymmetric information, to make the companies increase their levels of efficiency, to generate new investment, and to simplify the pricing structure.

The new method, price-cap tariff, establishes limits to the average prices of the firm. The general adjustment formula is:  $DCP = RPI - X + Y$ , where DCP is the rate of adjustment of the price-cap, RPI is the Retail Price Index, X is the productivity factor and Y a variable that considers the pass-through of unexpected costs to consumers. This method simplifies the tariff adjustment, stimulates productivity gains of efficiency and motivates investment<sup>6</sup>. This mechanism is considered more stable because it allows rate reviews at fixed intervals of time, in order to verify the economic and financial balance of the concession and, eventually, to adapt rates to unforeseen contingencies.

The goal of the rate review is to set rates that are consistent with the costs of distribution and suitable with a fair return on investments<sup>7</sup>, through the calculation of a Required Revenue<sup>8</sup>. The estimation of the X factor, which takes into account an estimate of the productivity gains in the following years of the cycle, is also a step for rate setting. Therefore, there is a significant incentive for the distributors to reduce the costs, since between two cycle reviews the companies can take advantage of the cost reductions. On the other hand, if the difference between operational costs defined in the review and the effective one that the company can achieve is negative, there will be a negative financial impact for the distributor.

The main criticism of this price cap method is the possibility of under-investment in customer-related service. The improvement of this type of service can require higher costs that may not necessarily have some return for investors, through the pass-through to consumers or in another way. Hence, the price cap model must have a strong regulatory apparatus that reinforces the desirable levels of investment and maintains satisfactory quality of the services.

A deeper analysis of the distribution segment shows that the transition between a ratemaking method that guarantees full coverage of costs and attractive rate of return, and a model based on incentives, brought new risks to the distributors. With the regulatory change, it is possible that the investments made by distributors may not have a satisfactory return, leading to financial losses. The cost pass-through to consumers in price-cap method does not contemplate mismanagement and inefficiency of the service, which can also result in financial losses mainly through regulatory penalties.<sup>9</sup>

In Brazil, the risk that most affects a distribution company's financial sustainability is contracting for long-term energy supply through auctions. If the company contracts power above the level necessary to fulfill its demand, it bears the excess cost, because there is a limit to the pass-through of those costs to consumers to encourage distributors to manage the energy market in an efficient way. Another significant risk in Brazil is the hydrological risk, because the Brazilian electricity system is hydro-based, creating the risk of increasing costs of energy in a drought scenario.

For the utilities in the United States, the report of Binz et al. (2012) offers an alarming analysis of these companies. The authors found a decline in credit quality and financial flexibility of the electric utilities over the past 40 years, especially in the last decade, in which no utility obtained an AAA rating and there was a large decline in the number of companies with AA rating. This fall in credit quality can be an important signal of the need to consider financial risk. Some analysts also point out that the credit profile of the utilities could decline even more due to the lack of operating cash flow in those companies to meet the investment needs of the sector.

The regulators must avoid a situation in which the only remaining options are the bankruptcy of a distribution company, or the cessation of the regulatory principles of prudence and reasonable cost recovery to rescue the company, putting a cost burden on consumers. This scenario could be avoided by considering financial aspects in the regulation of the sector. To analyze the feasibility of a regulatory policy of financial supervision for electric power distributors, we studied similar regulations already in course worldwide, as shown in the next section.

---

<sup>6</sup> As we will explain later, the cost reduction is an incentive mainly in the gap between two tariff reviews, but there are some cases where this method is not effective in improving investments.

<sup>7</sup> The proper determination of the return of the capital to ensure attractiveness to investors, is made by using the Weighted Average Cost of Capital (WACC) (IPEA, 2006).

<sup>8</sup> That is, compatible with efficient operating costs and return on invested capital (Cuberos, 2008).

<sup>9</sup> The revenues resulting from the application of penalties are applied to rate reductions (Cuberos, 2008).

### **3 FINANCIAL REGULATION OF DISTRIBUTION COMPANIES AROUND THE WORLD**

Three main recent cases of financial regulation of electricity distributors were analyzed: that of the Ontario Energy Board, the British Office of Gas and Electric Markets (OFGEM), and the Brazilian Electricity Regulatory Agency (ANEEL).

#### **3.1 Regulatory Guidelines: Office of Gas and Electric Markets and the Ontario Energy Board**

OFGEM<sup>10</sup> has established financial regulation rules and strategies for the electricity sector, and especially regarding the financial health of distribution utilities. The standards were designed to reduce the financial risks for the utilities, while assuring the continuity of service to consumers. The function of the agency in this regard is mainly to guarantee that the distribution companies can fulfill the requirements established by law or contract. The responsibility for the financial integrity of the distributor is a responsibility of the shareholders of the company.

It is important to highlight the conditions of "financial delimitation" included in the regulatory arrangements of OFGEM. The purpose of this regulation is to assure that the assets, cash flows and other financial resources of the utilities are sufficient to meet the needs of the companies, with sufficient resources to provide the service properly and efficiently, so that no such resources are used for other purposes.

In this regulatory framework, the utilities has the obligation to provide to OFGEM financial information, and as the first signs of financial problems appear, OFGEM can choose appropriate actions to address the situation. In this scenario, the regulator will analyze the reasons that led to the financial problems, also checking if the company was operating efficiently and cost-effectively. After identifying the causes of the problems, there are a number of steps<sup>11</sup> to remedy the situation. The most important one is to block the company's cash reserves in circumstances of financial concern, reaffirming the commitment to maintenance and service to consumers above the interests of lenders and shareholders.

The Ontario Energy Board (OEB)<sup>12</sup> uses an incentive policy<sup>13</sup> for utilities in the province of Ontario in Canada. The regulation by incentives works according to a scorecard for the Ontario electricity distributors, which includes various aspects of the performance of the utilities, generating evaluations and comparisons between companies, including financial aspects. The purpose of the regulator is to inspect and maintain the financial sustainability of the companies, with the use of financial accounting parameters, such as current ratio, debt service coverage, interest coverage, costs of operation, maintenance and administration costs by customer, and return on equity. The methodology of calculation<sup>14</sup> was developed in the form of financial ratios: liquidity (current ratio), leverage (short-and long-term debt) and profitability (included in the rate review and actually realized).

#### **3.2 The Financial Regulation in the Brazilian Electricity Sector – Instruments and Applications**

The Brazilian Electricity Regulatory Agency (ANEEL), stated since 2007<sup>15</sup> the development of regulatory rules for financial supervision of distribution companies. The distribution sector operates in the form of a natural monopoly, and its efficiency is conducted and organized by the standards and parameters set by ANEEL. ANEEL's Superintendency of Financial Supervision (SFF) has a consolidated role in gathering economic financial information from distributors.

A distribution company is responsible for the quality and continuity of the supply of electricity, and the renovation and expansion of its assets. This requires making investments (capital expenditures-CAPEX) and incurring in operating expenses (Operating Expenditures-OPEX). The company must also cover other obligations, such as debt service payment to lenders and financial institutions, taxes and the return on equity capital and dividends. If it

---

<sup>10</sup> According to OFGEM's policy document, the main goal of the Agency is to protect the interests of consumers of gas and electricity, for if the regulated companies experience financial problems that can impact the continuity and quality of service, OFGEM would be held responsible (Ofgem, 2009).

<sup>11</sup> A detailed explanation of those steps can be found in Ofgem (2008, 2009).

<sup>12</sup> The Ontario Energy Board regulates the distribution of electricity in the province of Ontario, with the goal of combining the interests of distributors and consumers. The new regulation, based on the performance of companies, aims to stimulate the development, productivity and innovation in the sector (Report of the Ontario Energy Board, 2012).

<sup>13</sup> *Ontario Energy Board* (2012).

<sup>14</sup> For more details, consult *Ontario Energy Board* (2014).

<sup>15</sup> Technical note n° 380/2007-SFF/ANEEL.

cannot generate funds to honor all its commitments, the company requires external resources, which can imply increasing in its leverage.

The economic and financial dimension of the concession is directly related to the operational dimension. The triggering event was the “Grupo Rede” collapse when the energy supply was under threat in seven Brazilian States.<sup>16</sup> This was an inflection point in the attitude of the agency towards the companies. After this episode, a sector diagnosis organized by the Agency indicated that a number of companies were presenting low financial results, motivating the improvement of the monitoring mechanisms of the economic and financial status of the distribution companies. It is important to emphasize that the systemic risk of the debt default of company causes problems along all the production chain, reaching the financial viability of the business, as in the case of the “Grupo Rede”, where several companies needed the intervention of ANEEL. This example shows the strict relationship between the operation and the finances of the company, although the operational dimension of the concessionaires is regulated in detail, while the financial regulation is poorly developed.

To guarantee the security and quality of the supply, the regulator should monitor the financial situation of the concessionaires, such as its ability to keep up with growing demand, expand their capacity to maintain the operation of the service, and still honor their commitments and applicable taxes, signaling its financial health. As an example of what is done in other regulated sectors of the economy, ANEEL intends to use accounting and financial methodologies to form a framework applicable to risk supervision of companies in the distribution segment, similar to what the national supplementary health insurance agency (ANS) does and in the banking sector. The ANS, through economic and financial indicators, seeks to identify if supplementary health insurers show evidence of transient or structural difficulty, especially with regard to the question of indebtedness. In the banking sector, where systemic risk can propagate the effects of insolvency of one or some institutions throughout the financial system, the financial supervision of banks and financial institutions is a central part of the regulatory apparatus. Prudential<sup>17</sup> regulation is widely used in the financial sector. It has specific preventive rules that guide the behavior of the agents and ensures that the information flow to monitor the situation, preserving the solvency of the institutions. This regulation applies leverage ratios and liquidity ratios, and limits the performance of banks regarding the composition of their asset portfolio, among others.

### **3.2.1 ANEEL’s New Economic and Financial Criteria for Electricity Distributors**

Evolving through the learning promoted by ANEEL, the Ministry of Mines and Energy (MME) may extend the concession of public utilities for 30 years, provided some requirements defined by ANEEL are met, among which the economic and financial sustainability of the companies. In this scenario, the utilities hold the responsibility to preserve the sustainability of the business, the management of resources, the debt levels, the investment levels, and the financial obligations.

Regarding the economic-financial analysis, ANEEL has established economic and financial standards to be met in the first five years of the concession, based on the following milestones: I. investment to replace depreciated assets; II. investment expansion and improvement of quality of service; III. payment of interest on debt; IV. working capital; V. taxes on profit; VI. remuneration of corporate capital, and in certain cases, VII. Amortization of principal, among other obligations.

It was defined by decree<sup>18</sup> that in the first and second years of a concession, the utilities must achieve positive EBITDA, that is, recurrent expenditures below operating income; in the third year, a positive cash flow after deduction of investment, that is, part of the company's revenue should at least restore the CAPEX; and at the end of fifth year, positive cash flow after deduction of investment and cost of debt.

### **3.2.2 Regulatory Response to Non-compliance with the Parameters of Sustainability**

The innovation in applying penalties is the understanding that the imposition of fines is not a proper way to treat distribution companies with financial difficulties. The penalties could push those companies to increase their leverage and the level of risk assessed by investors, that could led this companies to a meet a worse situation. This

---

<sup>16</sup>Ozorio (2011) has identified, through the analysis of the results from 2006 to 2011 using accounting and financial methods, that Grupo Rede’s companies presented problematic indicators, such as worsening operating margins, high risk of default due to an unsatisfactory operational results, and high indebtedness. This was confirmed with the crisis of the group in 2012, where eight companies required intervention from Aneel.

<sup>17</sup> A second type of regulation concerns systemic risk, to prevent the occurrence of events that spread throughout the economic system, and thus avoid financial crises. There is also behavioral regulation, i.e. normative rules to discipline the practices adopted by market agents in relation to their competitors and consumers.

<sup>18</sup> Decree n° 8.461, 2015.

innovation is associated with what is called Prudential Regulation, increasing the involvement of controlling shareholders to meet the minimum parameters defined by the regulator. If this clause is refused, the participation of the same investor in another project in electricity market will be limited.

In addition, if the distributor does not reach the minimum standards of sustainability, the new policy establishes that the distribution of dividends or interest on equity capital will not be allowed until the regularization of the utility's finances. Finally, in the case of persistent difficulties and non-achievement of the goals after five years, the concession can be canceled.

## 4 CONCLUSION

The financial supervision of electricity distribution companies is still at an early stage in academic centers, in government agencies and among international regulators. The need for financial risk management arises from the current tariff structure that raised the exposure of utilities to financial losses. In Brazil, the collapse of one of the largest distribution energy holdings in the country, caused by a gradual financial deterioration, led the regulator to adopt extreme measures to mitigate the social damages. After this emblematic case in the Brazilian electricity sector, new financial problems were identified in other companies, indicating the need of a monitoring framework for the electricity sector. Financial regulation, already used successfully in other regulated sectors, could be applied to the electricity sector for financial supervision of the electricity distributors, with the adoption of prudential practices to prevent future supply crises created by financial mismanagement.

Financial regulation is an important topic worldwide, but there is not a standard way of its application, even when taking into account possible variation in objectives. The use of accounting and statistical instruments is important to the financial supervision of companies, as already being developed by OFGEM, OEB and ANEEL, to encourage the financial health of the companies and to ensure the service continuity and quality. Specifically, in the case of ANEEL, the regulation also has a focus on anticipating the detection of any sign of financial difficulties of companies and to act fast in these cases.

The general conclusion is that financial regulation is a highly relevant matter and has to be implemented in the electricity sector to avoid social losses caused by the concessionaires' mismanagement.

## REFERENCES

- Araújo, J.L. (2001). Modelos de formação de preços na regulação de monopólios. *Econômica*, v3, n. 1, p. 35-66.
- Armstrong, M., Cowan, S., Vickers, J. (1994). *Regulatory reform: economic analysis and British experience*. MIT Press.
- BINZ, Ron; Sedano, Richard; Furey, Denise; Mullen, Dan. (2012). *Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know*. Boston: Ceres.
- Castro, Nivalde José de; Brandão, R.; Ozorio, L. (2011). "O Desempenho financeiro das distribuidoras de energia elétrica e o processo de revisão tarifária periódica". *Texto de Discussão do Setor Elétrico n.º. 34*, Rio de Janeiro.
- Cuberos, F.L. (2008). *Novo Modelo Institucional do Setor Elétrico Brasileiro: Análise dos Mecanismos de Mitigação de Riscos de Mercado das Distribuidoras*. Dissertação de mestrado. Escola Politécnica da Universidade de São Paulo.
- Fugimoto, S. K. (2010). *Tese de Doutorado. Estrutura de Tarifas de Energia Elétrica Análise Crítica e Proposições Metodológicas*. Escola Politécnica da Universidade de São Paulo, 2010.
- Leite, Antonio Dias. *A energia do Brasil*. Rio de Janeiro, Nova Fronteira, 1997.
- Nota Técnica N.º 175/2015 - SCT-SFE-SFF-SRD-SRM/ANEEL. *Minuta dos novos Contratos de Concessão para Prestação do Serviço Público de Distribuição de Energia Elétrica, nos termos do Decreto n.º 8.461/2015 e Lei n.º 12.783, de 11 de janeiro de 2013*. Junho de 2015.

Nota Técnica nº 353/2014-SFF/ANEEL. Abertura de Consulta Pública visando coletar subsídios para a formalização e o aprimoramento da fiscalização do equilíbrio econômico e financeiro das distribuidoras de energia elétrica, compreendendo a instituição de indicadores públicos de sustentabilidade. Dezembro de 2014.

Nota Técnica nº 380/2007-SFF/ANEEL, a SFF iniciou um processo de “Aprimoramento do Monitoramento do Desempenho da Gestão Econômico-Financeira das Concessionárias de Serviço Público de Energia Elétrica”. Outubro de 2007.

OEB (Ontario Energy Board). 2012. Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach.

OEB (Ontario Energy Board). 2013. Filing Requirements For Electricity Distribution Rate Applications.

OEB (Ontario Energy Board). 2014. EB-2010-0379: Performance Measurement for Electricity Distributors: A Scorecard Approach.

OEB (Ontario Energy Board). 2015. 2014 Yearbook of Electricity Distributors.

Ofgem (Office of Gas and Electricity Markets). 2008. Arrangements for responding in the event that a network company experiences deteriorating financial health. Document 158/08.

Ofgem (Office of Gas and Electricity Markets). 2009. Arrangements for responding in the event that a network company experiences deteriorating financial health. Document 123/09.

Peano, C.R. (2005). Dissertação de mestrado: Regulação Tarifária do Setor de Energia Elétrica no Brasil: Uma Análise da Metodologia de Revisão Tarifária Adotada pela Aneel. Universidade de São Paulo.

Pires, J.C.L, Piccinini, M.S. Modelos de Regulação Tarifária do Setor Elétrico. BNDES.

Rocha, K., Bragança, G.F; Camacho, F. (2006). Remuneração de Capital das Distribuidoras de Energia Elétrica: Uma Análise Comparativa. IPEA, Rio de Janeiro.