

Pass Through of Power Purchase Costs Regulatory Challenges and International Practices

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FOREWORD

Dramatic changes in sector regulation, structure and ownership have marked the last two decades of the electricity industry around the world. Much of the focus has been on creating competitive power markets. Arguably, with the benefit of hindsight, this enthusiasm for trying to create competitive markets was not justified in small countries with little potential for effective competition. Nevertheless, wherever there has been unbundling and de-verticalization, an important, but often ignored, regulatory issue in both developing and developed countries is the pass through of power purchase costs for separate distribution companies. Without rational regulatory policies, it will be impossible to achieve sustainable power sector reforms, a principal goal of the Bank's recently announced Infrastructure Action Plan.

Establishing regulatory policies for power purchase costs is an important issue since power purchases constitute the single largest cost for distribution utilities. Like almost all regulatory issues, regulators must balance consumer and investor interests. Since consumers usually have no alternative suppliers, they obviously want distribution companies to purchase efficiently on their behalf. Ideally, consumers want distribution companies to have a mix of long term and short term purchases at the lowest possible cost. Distribution companies, on the other hand, want assurances that the costs of past and future power purchases can be recovered in the tariffs that they charge their customers. Distribution companies also point out that no one will be willing to build new generating plants to sell electricity to them if regulatory "benchmarks" for the pass through of power purchase costs are set too low. The regulator must come up with clear rules that satisfy these competing interests. The emphasis, then, should be on how to improve regulatory policies to obtain better, real world results.

This paper examines the alternatives available to regulators in establishing rules for the pass through of power purchase costs. As with other papers in our Sector Board discussion paper series, it goes beyond general theory and first principles. It describes different specific approaches available to regulators based on the authors' experience in several countries and their direct knowledge of regulatory actions and policies in other countries. The paper analyzes the pros and cons of different approaches and how they depend on the sector's underlying structure.

The genesis of this paper was a request from the Brazilian Ministry of Mines and Energy in 2002 to take a fresh look at international experiences with power purchase pass through mechanisms and recommend alternatives to the approach then being used in Brazil. There was general recognition that the existing system of administratively established price caps known as "valores normativos" had contributed to under-investment in generation and was one of the factors that had led to serious rationing in most of Brazil in 2001. It soon became apparent that our work on behalf of the Brazilian government, funded by the Public Private Infrastructure Advisory Facility (PPIAF), would be of interest to a number of countries since Brazil's experience was not unique.

The paper does not present a "magic solution" that applies in all circumstances and all times. It does, however, provide detailed descriptions and analysis that will be of use to government officials, regulators and power sector managers who are facing similar issues in a variety of sector structures. Therefore, I believe that the paper will be of considerable interest to World Bank clients in many developing and transition economy countries. I would like to commend the three authors for synthesizing the experience of many countries and bringing focus and clarity to an important issue for sustainable power sector reform.

Jamal Saghir

Director, Energy and Water
Chairman, Energy and Mining Board
February 2004



ABSTRACT

An important, but often ignored, regulatory issue in developing and developed countries is the pass through of power purchase costs for distribution companies. It is important because power purchase costs constitute the single largest cost for distribution utilities. Pass through rules are especially important for most developing countries because incumbent utilities are likely to be the sole supplier of most retail customers for the foreseeable future. Therefore, the electricity regulator must establish rules that create incentives for distribution utilities to purchase efficiently while being able to recover the costs of their purchases.

This paper identifies, compares and contrasts several pass through methodologies used in both developed and developing countries. It presents lessons learned and best practices. The paper suggests that the best methods for establishing pass through benchmarks rely on market prices and competitive procurements. However, when power sectors are at the very early stage of reform, market prices may be not available or may be distorted by market power. The paper examines these cases and proposes an evolutionary path for pass-through regulation. This regulatory path is meant to be indicative rather than prescriptive. Ultimately, the best methodology will depend on a country's objectives and sector structure which, in turn, implies that the specifics of the pass through rule will have to be designed on a case-by-case basis.

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This paper could not have been written without the assistance of many friends and colleagues inside and outside the World Bank. These individuals helped us to develop an understanding of the power sector and regulatory reforms in developing and developed countries. They gave freely of their time and insights to make sure that we got the facts right and understand what the facts really meant. They include Sabah Abdullah, Ian Alexander, Tonci Bakovic, Max Bradford, Marco Carvalho, Vivien Foster, Nelson de Franco, Philip Gray, Chantale LaCasse, Mário Pereira, Jayme Porto Carreiro, Michael Rosenzweig, Fred Sampaio, and Alan Townsend. Of course, none of them should be held responsible for any errors of fact or interpretation that remain despite their best efforts to educate us.

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Finally, we wish to acknowledge the financial assistance of the World Bank's Energy and Water Department (EWDEN) in preparing this report.

We owe a special debt of gratitude to the department's director, Jamal Saghir. Jamal provided resources and encouraged us to pursue this topic, because of his strong view that the Bank must provide practical assistance on the "second generation" power sector reform and regulatory issues.

EXECUTIVE SUMMARY

Dramatic changes in sector regulation and structure, risk allocation, and pricing schemes have marked the last two decades of the electricity industry around the world. Throughout this period, the focus has been on creating competitive power markets, establishing spot pricing, managing congestion, arranging payment for generation capacity and reserves, responding to demand, and monitoring market abuse. Indeed, these are all key elements in reforming the wholesale power market to make it more organized and competitive; however, less attention has been given to how power purchase costs should be paid for by distribution companies and recovered from their end customers. Accordingly, this paper examines issues related to the “pass through” of these costs, and addresses concerns, requirements, and experiences in the design of pass through methodologies.

The paper discusses international experiences to show that performance-based, market-driven mechanisms are the most desirable in managing pass through power purchase costs.

To be effective, pass through methodologies have to achieve multiple, often conflicting objectives. Some of the most important among those objectives are providing incentives for efficient procurement, fostering power sector expansion, eliminating some of the market volatility, and at the same time conveying some price signals for demand to react to prices. Ease of implementation by the regulator is also a desirable goal. Finally, methodologies have to be able to mitigate structural failures that are caused by market or sector design hostile to competition.

Pass through practices and regulation should provide incentives for efficient energy procurement, mitigate price volatility, allow distribution companies to recover legitimate power purchase costs in full and encourage them to enter into long-term power purchase agreements, and reduce the potential for self-dealing and collusion. While performing this regulatory task, however, the goal of eliminating unnecessary regulatory actions and decisions and reducing the opportunity for price manipulation by government should be kept in mind.

There is a concern about the pass through of power purchase costs whenever a power enterprise is positioned

to sell to customers who do not have the legal right to purchase from alternative suppliers or supply their own power. A supplier acting as a monopoly may not be buying power or building power efficiently—and its customers are put at disadvantage because they do not have the option of looking for alternative suppliers or taking their business elsewhere. The regulatory challenge is to avoid this scenario while ensuring the transfer of legitimate costs incurred by a distribution company to end customers.

The pass through of energy costs can be regulated in a number of ways. This paper describes the various methodologies—not as a rigid, prescriptive guideline, but in a sequence that somewhat follows the power industry's stages of development. The international experience is discussed in detail, with case studies highlighting examples from several countries such as Argentina, Brazil, Chile, Colombia, El Salvador, Guatemala, Panama and Peru, in addition to developed countries such as Holland, Northern Ireland, and several regions in the United States.

- *The Full Pass Through* of energy costs is usually adopted when the government or the regulator has determined that a distribution company has limited or no discretion to influence volumes, prices, risk allocation, or choice in power procurement. In this scenario the company is allowed to recover its full purchase costs by automatically passing them on to retail customers.
- *The Review of Energy & Power Contracts* (which can be conducted before or after the signing of a contract, and referred to as “ex ante” and “ex post,” respectively) is done individually and a decision rendered in terms of the “reasonableness” of the prices, risk allocation, and other specifics involved. Based on this assessment, the regulator may approve full pass through or prohibit some or all energy costs from being passed on to retail customers—or may decide that certain contract terms should be dropped or modified. The government or legislature may also perform an additional review in lieu of one performed by the regulator.

Ex Ante Reviews aim to ensure that the contract complies with the electricity laws as well as with contract guidelines that may have been previously set by the government or the regulator.

Ex Post Reviews, particularly in developing countries, may be conducted when there is an allegation of corruption or incompetence in the award of a particular contract. They are almost always extremely contentious and generally undesirable because they tend to deal with extreme examples of incompetence and inefficiency and tend to drag on seemingly interminably. The recommendation in this paper is that such reviews should be used only if there is clear evidence of pervasive corruption, major commercial malpractice, or legitimate “acts of God.” Given the likelihood that this kind of review may be motivated by political considerations, it should be seen as a “last resort.”

- The methodology of *Administratively Set Benchmarks* involves defining a “reasonable” cost for power purchases using administratively established estimates of investment and operating costs. These estimates are then used to serve as a reference to performance based regulation, where the efficiency (or inefficiency) in power procurement is shared between the disco and its customers. This approach may bog down in controversy as well, since the establishment of the benchmark is subject to political manipulation. The recommendation in this paper is that even though this approach may prove useful and necessary early in the reform process, it is desirable to move on to the methodologies of *Contract Market Prices* or *Multi-Market Benchmarks* (summarized below) as soon as feasible.
- *Multi-Market Benchmarks*—based on the price of power traded between companies that generate power and companies that distribute it—may offer an interesting alternative. Regulators establish one or more market benchmarks as a baseline for assessing a distribution company's power purchase costs. If the company is able to acquire energy at a price below the established benchmark(s), it retains all or part of the difference, as an incentive to good procurement.¹ If it pays more than the benchmark, however, it bears all or part of the additional costs (in other words, it is not allowed to recover these costs through tariffs). This mechanism better aligns the interests of the company shareholders with the interests of the customers because they both benefit from lower prices.
- *Mandated Competitive Procurement*—the last alternative is to introduce a mandated and competitive procurement process for most of the energy needs of a distribution company. In exchange for this commitment, full pass through of the purchase costs to the customers is allowed. This is possibly the best methodology, provided that well drafted regulations are put in place. Rules and regulations should enable transparency and a level playing field in the procurement process, without creating unnecessary barriers to entry for new players. Mandated Competitive Procurement is a viable alternative at several stages of industry and market reform. The nature of the procurement process will vary, depending on whether the distribution company plays an active or passive role in designing and implementing the procurement.

It is important to note that none of the methodologies summarized above and explored in more detail in this paper is appropriate for power sector models across the entire spectrum. The choice of methodology depends in some measure on the characteristics of the sector. One example mentioned in the paper cites the absence of a functioning market, which makes a market benchmark inadvisable. Another example concerns the presence (or absence) of affiliated generators or marketers. When a distribution company has the right to buy from an affiliated generator or marketer, there is always the possibility that it may pay higher prices or assume more risk than it would if it were purchasing from a non-affiliate. One of these issues concerns the potential for “self-dealing.” And how this detrimental outcome for customers may be mitigated.

Even though an “apples and apples” comparison is not possible, owing to different characteristics and circumstances (such as feasibility as mentioned above) involving pass through methodologies, this paper presents a side-by-side assessment to explore the strengths and weaknesses of the different methodologies in a direct and transparent way.

The assumption held by the authors is that despite all the challenges outlined, there is sufficient regulatory capability to reform the power distribution sector.

Nonetheless, there are still some pass through-related issues that remain unresolved from a regulatory standpoint. Lack of consensus on how to address those issues in part reflects insufficient empirical evidence, as well as the difficulty of coming up with a solution tailored to a variety of potential problems.

Finally, a consensus has not emerged on how to adjust pass through regulations based on distribution company performance—specifically, how to calibrate penalties and incentives—so that power purchase costs are shared in a fair manner.

The key recommendations outlined in this paper cover a range based on the principle that the sector evolves and becomes more competitive over time. Ranging from no competition to full competition, they are not meant to be a rigid, prescriptive evolutionary path for the power sector to be followed by every single country, but simply to illustrate some of the best pass through methodologies that may be available to regulators as the sector changes.

Since there is no single pass through approach that works in all situations. As the power sector evolves, so must the procedures for pass through. The design of the wholesale market and the pass through mechanism should go hand in hand, developing over time to maximize the potential synergies between retail and wholesale markets. This is not to imply, however, that the proposed evolution should bring about unpredictable changes and regulatory uncertainty among industry players. It is important to establish a road map for the evolution of pass through methodologies based on a long-term view of reform and stable development of competition in the power sector as a whole, as proposed in this paper.

1. WHY IS PASS THROUGH OF POWER PURCHASE COSTS AN IMPORTANT ISSUE FOR ELECTRIC SECTOR REFORM?

Introduction

During the last two decades, the electricity industry around the world has gone through a revolution in regulation, sector structure, risk allocation, and pricing systems. Much has been written or discussed about competitive power markets, spot pricing, congestion management, payment for generation capacity and reserves, demand response, and monitoring of market abuse—all critical elements for any reform effort that attempts to establish an organized and competitive wholesale power market.

However, less attention has been given to how power purchase costs should be paid for by distribution companies (or by single buyer entities acting on their behalf) and recovered from their final customers. The sustainability of any reform depends ultimately on whether there is consistency between upstream (that is, wholesale markets or single buyer procurement) and downstream (that is, retail supply) regulatory mechanisms. A very important, but often ignored, regulatory design issue is how the regulator decides on the allowed pass through of power purchase costs incurred by separate distribution companies (henceforth called “discos”) or the distribution components of vertically integrated power companies.

In the past, pass through regulations were relatively straightforward. Utilities, particularly in the United States, usually operated under a “cost-plus” regime governed by a “regulatory compact.” This compact did not fully protect utilities against disallowance or findings of imprudence for purchases and construction of their own plants. In general utilities were allowed to fully recover their costs, if they were able to pass a regulatory review of “prudence.”

Unbundling and competition, driven by power sector reform in many countries, have created new, more complex interfaces between generation and retail supply.

There are now more opportunities for efficient power procurement and cost reduction—which need to be encouraged. At the same time there are also more opportunities for gaming and trading among affiliates—which need to be closely monitored.

Regulators should become concerned about the pass through of power purchase costs whenever a power enterprise is selling to captive customers (that is, customers who do not have the legal right to purchase from alternative suppliers). In the traditional language of regulation, the supplier of the captive customers has a monopoly franchise, raising the regulatory concern that the monopoly supplier may not be buying or building efficiently and its customers are hurt because they do not have the option of taking their business elsewhere. The fundamental challenge is to create regulatory mechanisms to provide discos with incentives for good procurement while also ensuring adequate supplies of new generation.

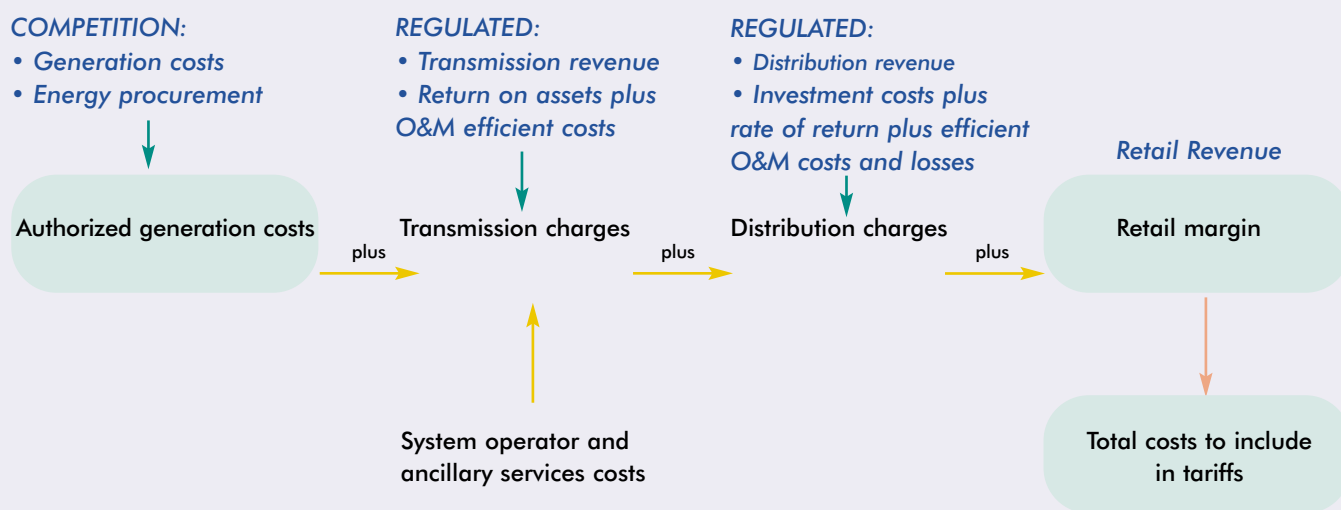
Figure 1 illustrates the typical supply chain and associated cost components within the electric sector. This paper will focus on the pass through mechanisms for power purchase costs, labeled in figure 1 as “Authorized Generation Costs.”¹ These costs typically represent 30 to 50 percent of the total costs of the supply chain, but may be as high as 70 to 80 percent in some African countries or in some states in India. Power purchase costs are higher in these countries because, among other factors, losses are higher. When a distribution company loses 30 to 40 percent of its acquired electricity because of technical and non technical losses, it has to purchase more power from power generating companies (generators) and other suppliers than would a disco that loses only 10 to 15 percent (privatized discos in Latin America are an example of the latter). In such circumstances, it becomes even more important to design effective pass through mechanisms to encourage the distribution company to purchase economically.²

Discos usually contend that power purchase costs are, to a large extent, beyond their control. They argue that energy costs, often the most important single item in

¹ This paper assumes that transmission and distribution charges (“wire costs”), as well as ancillary services are recovered on a “cost-plus” basis. Retail margin may also be recovered in the same way or driven by competitive forces.

² It may be reasonable for the regulator to review the quantity of power purchased by the disco if the disco is buying excessive amounts of power because of high losses on its distribution system. However, the regulations to help reduce distribution losses are outside of the scope of this paper.

FIGURE 1. Pass Through Cost in the Supply Chain



Note: O&M Operations and management

their cost structure, should be a full pass through component in the tariff-making process. In contrast, regulators are generally wary of automatic pass through procedures, which may lead to inefficient and sloppy buying practices, “sweetheart deals,” or even intentional overpayment to generators from distributors in return for a hidden “kick-back.”³ In the view of discos, limits on pass through of power costs represent a substantial new regulatory risk. They argue that any attempt to impose limits or delays in the pass through of energy costs to the final customer could bankrupt them.⁴

Objectives

This paper aims to address concerns, requirements, and different experiences in the design of power purchase cost pass through methodologies.⁵ While no country’s experience has been perfect, some countries have been more successful than others, in terms of fostering good purchasing behavior and encouraging generation capacity expansion. Important lessons can be learned

from success stories and can have broader application. In general, international experience shows that the problem may be tackled more effectively with the support of performance-based, market-oriented mechanisms—whether the market mechanism is a one-time competitive procurement for long-term supplies or an ongoing competitive spot market.

2. DESIRABLE GOALS FOR EFFECTIVE PASS THROUGH REGULATION

Overall Goals

An effective pass through mechanism has to strike a delicate balance between two major and usually conflicting goals for any regulator: establishing reasonable rates while providing efficient incentives for power system expansion. Regulators have the obligation to protect customers from unreasonable and uneconomic wholesale purchases,⁶ but they also have a statutory

³ See Bakovic, Tenenbaum, and Woolf (2003).

⁴ The bankruptcy of the Pacific Gas and Electric Company (PG&E), in the midst of the California crisis, was attributable, in large part, to the unwillingness of the Public Utility Commission in California to allow pass through of PG&E’s costs or power purchases. The two main power utilities claimed that they had accumulated some US\$ 12 billion in uncompensated costs because of the high prices they paid for wholesale electricity. Consequently, they lacked the credit to purchase wholesale power, and their debt rating was slashed to junk-bond status. See Besant-Jones and Tenenbaum (2001, p. 28).

⁵ Power cost pass through procedures have to address two basic dimensions: price and quantities. This paper focuses on the regulation of prices. Incentive systems for minimizing the quantity of electricity purchased are discussed in Bakovic, Tenenbaum, and Woolf (2003, pp. 36–39).

⁶ We use the term “protection” in a broad sense. It is not meant to imply that short-term price increases should always be avoided. This would be shortsighted. In the long term, consumers are protected if the regulator creates a regulatory system that facilitates the necessary investments to guarantee the long-term reliability of supply and thereby avoid shortages of power. Consumers are not protected if the regulatory system leads to shortages of supply.

obligation to set prices that allow the industry to generate enough funds to provide for a sustainable expansion of the power system. The balancing of these two goals is the central focus of this paper.

These two overall goals imply several subsidiary goals:

Subsidiary Goals

(a) *Provide incentives for efficient energy procurement*— This is the *raison d'être* of any pass through mechanism. Good procurement implies good incentives to purchase power at minimum cost, and a regulatory mechanism to share these gains (or reasonable losses) with the final customer. The requirement of “economic purchasing” is found in most distribution licenses (or concession agreements.) But as new regulators quickly discover, it is one thing to have a formal, legal requirement and it is an entirely different matter to create economic incentives that will transform the legal requirement into actual behavior. Unless there is convergence between the “legal” and the “economic,” the legal requirement in the license may be nothing more than empty words on a piece of paper.

(b) *Reduce price volatility to customers*—Many customers do not want to be fully exposed to excessive volatility in the wholesale markets.⁷ Moreover, it is generally more efficient to have discos managing this risk by contracting in the forward markets.⁸

(c) *Allow discos to fully recover legitimate power purchase costs*—Discos will face significant risks if they are not allowed to fully recover most of the energy costs incurred when procuring energy effectively within a reasonable timeframe. By the same token, discos do not want to be exposed to

regulatory risks if the pass through mechanism sets a cap on the costs that may be passed on to the customer, particularly if the discos have to buy a large portion of their energy needs in a volatile spot market.⁹

(d) *Provide efficient price signals for demand to react*— The worldwide experience in trying to create competitive power markets has shown that it is extremely beneficial to have the load (or at least part of it) react to prices in the wholesale market.¹⁰ If some end consumers see spot prices, it creates more demand elasticity and may mitigate the market power of generators. Therefore, it seems reasonable to try to transmit some price signals (and accompanying volatility) to at least some of the final customers. However, there is clearly a tradeoff between conveying accurate price signals and the goal of reducing price volatility to customers, as suggested in item “b” above.¹¹ The delivery of market signals has to be acceptable and understood by electricity users. And, in general, consumers will not want to see market prices unless they think they have the capability to respond to such prices in a manner that will lower their overall electricity bill.

(e) *Provide incentives for discos to establish long-term energy contracts (power purchase agreements or PPAs)*—In many countries, generators will not build new plants unless they have a long-term contract. The contract is, in effect, a prerequisite for expansion. If the regulator sets an artificially low cap on pass through, discos will not find willing suppliers, and long-term expansion will be jeopardized. This is particularly true in countries in which bulk power markets are in the early stages of power sector development. In such countries, discos may be the only potential buyers in the absence of retail competition.

⁷ See Littlechild (2003, pp. 68–70). This subject will be discussed in more detail in chapter 3.

⁸ By forward markets we mean any agreement involving prices and quantities that is set on an ex ante basis and is able to reduce the volatility of the spot prices. If forward agreements are very short term (for example, day ahead), or are indexed to the spot prices, they will not achieve the goal of reducing price volatility. On the other hand, if agreements are closed well in advance of the real-time spot market, and have sufficient duration (for instance, long-term bilateral contracts), prices will reflect expected medium- and long-term conditions, therefore providing greater reduction in price volatility and price hedges to final customers.

⁹ This occurred in Northern California during the 2001 crisis. The Pacific Gas and Electric Company (PG&E) was forced to buy most of its energy requirements on a short-term basis (day ahead or spot), while retail rates were frozen. The mismatch between costs incurred and costs passed through to final customers led to bankruptcy. Please refer to footnote 4 for more details.

¹⁰ Power pools such as Pennsylvania - New Jersey - Maryland (PJM), New York Independent System Operator (NYISO), and New England Pool (NEEPOOL), all in the United States, have in the last few years worked to improve the mechanism of price demand response. In Europe, France is an interesting example of a significant number of customers' being partially exposed to prices in the wholesale market. Results in terms of system cost and reliability have been extremely promising. Demand-side response depends not only on the pass through regulations, but also on the existence of other mechanisms in place, such as retail competition, some form of time of use metering or real-time mechanism to reduce loads (for example, disconnection of water heating system), pricing, adequate contractual arrangements, and possibly the existence of a functioning spot market.

¹¹ A possible tradeoff is to convey part of the wholesale market price volatility to large customers, which usually have more price elasticity; the fixed transaction costs of obtaining financial hedges and implementing real-time metering will have less impact on their total energy bill.

If prices are set too low, it will be virtually impossible for discos to procure energy from willing suppliers.

(f) *Reduce the opportunity for price manipulation by government*—A pass through regulatory mechanism should be clear, transparent, and objective. It should be based on a formula with parameters established in advance and with limited room for interpretation. If the government or the regulator has considerable discretion in interpreting the pass through formula, this creates unnecessary risks, both for generators and distributors.¹²

(g) *Reduce the potential for self-dealing and collusion*—A poorly designed regulatory pass through mechanism may provide opportunities and incentives for players to enter into “sweetheart” deals with affiliates or to engage in collusion with other players. This raises the cost of power purchases and tariffs to final customers.¹³ While the pass through methodology itself is not the cause of the market imperfections, some pass through mechanisms may be more effective than others in stopping such conduct.

(h) *Minimize the number of regulatory actions and decisions*—The application of the pass through mechanism should be as simple as possible. Some designs, however, may require more actions by the regulator—such as defining benchmarks on a contract-by-contract basis,¹⁴ distinguishing between purchases for captive and free markets (that is, non-price-regulated customers), monitoring contracts, establishing rules for competitive procurement, and other regulatory interventions. Whenever possible, the number of regulatory decisions should be minimized. However, some form of regulatory capability and intervention will always be necessary, no matter the simplicity of the selected pass through mechanism.

3. METHODOLOGIES TO REGULATE POWER PURCHASE COST PASS THROUGH¹⁵

Range of Methodologies

A wide range of methodologies exists to regulate the pass through of energy costs faced by discos. The methodologies discussed here should not be construed as a rigid, prescriptive guideline. However, the sequence in which they are presented in this chapter bear some correlation with the power industry's stages of development. The principal methodologies are described as follows:

- (a) Full-Pass Through of Power Purchase Costs;
- (b) Review of Power Contracts (Ex Ante or Ex Post);
- (c) Administratively Set Benchmarks;
- (d) Mandated Competitive Procurement for Physical or Financial Contracts; and
- (e) Market Benchmarks Based on Spot or Contract Prices or a combination of the two (Multi-Market Benchmarks.)

Table 1 lists countries, states, or regions within countries where these methodologies have been applied. It is important to note that these methodologies are not mutually exclusive. Sometimes a country will adopt two mechanisms. For example, the Guatemalan regulator may review the mandated competitive procurement process for compliance with its guidelines *and* conduct an ex ante review of the proposed financial contracts that result from the procurement process.

The main features of these methodologies will be discussed in turn.

Full Pass Through of Power Purchase Costs

This approach is usually adopted when the government or the regulator has determined that a disco has limited

¹² A possible form of manipulation by a government or by a regulator is to set future expected spot prices or long-run marginal costs that pass through to tariffs based on unrealistic assumptions about new generation entry, cost of capital, plant construction schedule, and fuel availability. One example of this phenomenon was the impact of the development of the Camisea gas field in Peru on the estimate of future (48 months) power spot prices used to calculate average energy prices to be passed on through tariffs. See Bakovic, Tenenbaum, and Woolf (2003, p. 33) for a discussion on the “ghosts of Camisea.”

¹³ According to the current Minister of Mines and Energy in Brazil, the existing pass through mechanism in force has allowed utility companies to gouge customers by entering into contractual arrangements with affiliates at above-market prices. Such undesirable behavior required regulatory action, such as the introduction of mandated competitive procurement. (O Estado de São Paulo, February 06, 2003.) More recently, ANEEL (the Brazilian national electricity regulator) has concluded that discos have been willing to accept more contractual risk on purchases from affiliated generators. See ANEEL (2003).

¹⁴ This is the case in Brazil, where each long-term contract with duration equal to or longer than two years is tagged with a specific benchmark and with a specific escalation clause, including different weights and price adjustment indexes.

¹⁵ The discussion in this chapter draws from Maurer and Arizu (2002), and from Bakovic, Tenenbaum, and Woolf (2003 p. 30).

Table 1. International Examples of Pass Through Methodologies

METHODOLOGY	VARIATIONS	EXAMPLES
Full Pass Through of Power Purchase Costs	"Prudent" expenses in cost-plus regime	Most USA utilities
	Vesting contracts ^a	Brazil, Argentina, Panama, Nicaragua, Guatemala, El Salvador
	Purchases from a single buyer	Hungary, Northern Ireland
Review of Power Contracts	Ex ante	Guatemala, Panama, Nicaragua, Massachusetts and Nevada (USA)
	Ex post	California (USA), India
Administratively Set Benchmarks	Benchmark based on regulator's estimates of long-run marginal cost for new generation	Normative Value (VN) in Brazil (current)
	Benchmark based on estimates of the disco's "avoided cost"	The United States under the 1978 Public Utility Regulatory Act (PURPA)
Mandated Competitive Procurement	Physical contracts	Florida (USA)
	Financial contracts	Panama, Guatemala, Nicaragua, New Jersey (USA)
Market Benchmarks	Spot	Chile, Peru, El Salvador, Bolivia, Argentina
	Contracts	Brazil (planned)
	Spot and Contracts (Multi-Markets)	Colombia, The Netherlands

^a Contracts for power purchases that are usually assigned to a new distribution company at the time of privatization.

Source: The World Bank.

or no discretion to influence volumes, prices, risk allocation, or choice in power procurement. When the regulator concludes that the disco has little or no control over a particular purchase, he or she will usually allow the buyer to recover its full purchase costs by automatically passing them on to retail customers.¹⁶ The most prominent examples are "vesting contracts" assigned at the time of privatization and restructuring, mandated purchases from "single buyers," and obligatory purchases under a Build, Operate & Transfer (BOT)¹⁷ agreement. Each one of those cases is examined below.

transmission company or system operator controlled by the national government. This was the approach followed in Hungary and Northern Ireland. In either case the government implicitly or explicitly guarantees the purchases of the single buyer. When there is a mandated, "top down" single buyer, distribution utilities will typically have little or no influence on the purchases made by this entity. As a consequence, the government will put pressure on the regulator to allow full pass through of the costs incurred by discos when acquiring power from the single buyer. Any disallowance would put the government at risk.¹⁸

The Single Buyer Model

Many countries have opted for a single buyer model in the early stages of power sector reform. This means that generators may only sell their electricity to a single entity. It also usually implies that this single entity has been granted the exclusive legal right to supply all of the power needs of the distribution entities. Under this sector model, both the discos and the customers of the discos are captive customers.

There are many variations in the implementation of a single buyer model. One possibility is to have the state-owned integrated power company purchasing from independent power producers to supply its own distribution divisions. This has been the approach taken in many Asian countries in the early stages of power sector reform, such as Pakistan, Thailand, and others. Or alternatively, the single buyer may be located within a national

¹⁶ In some developing countries, bulk tariffs were maintained at subsidized levels, distorting expansion and contracting decisions. However, full cost recovery for distributors does not necessarily imply that the tariffs recover the generators' full cost. This was the case in Brazil during the 1980s. There was an estimated revenue shortfall of more than US\$25 billion, which was subsequently recovered from the taxpayers. The lack of an independent regulatory authority was a factor that certainly contributed to price suppression.

¹⁷ The typical single buyer entity is a mandated, top-down, government-owned enterprise—but it does not have to be designed this way. An alternative form of single buyer would be a voluntary, bottom-up buying agency, formed by a group of municipal distribution utilities to acquire power supplies on their behalf. The joint action agency would perform this function by buying power on spot markets or through contracts or by purchasing ownership interests in existing or new generating units that may also be owned by one or more vertically owned utilities. Such entities have existed for many years in the United States. For example, in Wisconsin, 37 small municipal distribution utilities, serving a population of about 250,000 people, created a jointly owned company called Wisconsin Public Power Inc. (WPPI) to cover their power needs. The goal of WPPI is to be "a smart, efficient and aggressive aggregator of power for the benefit of our member communities." This means developing and maintaining a diverse power supply portfolio from which members may offer their customers electricity that will be more attractive than other options. In general, there is little or no regulatory oversight of the actions of the joint action agencies. The rationale for this "hands-off" regulatory approach is that, contrary to the typical "top-down" approach of single buyers, the joint action agency is owned and governed by its beneficiaries.

¹⁸ This happened in California during its recent power crisis. The state government designated the Department of Water Resources, a state agency, as the sole buyer for customers of the privately owned utilities and the state legislature enacted a law that required the regulatory commission to pass through all of the state entity's power purchase costs in retail rates of the private distribution companies.

Vesting Contracts

Vesting contracts are usually assigned to discos by the government as part of a reform or privatization package. The contracts are usually imposed because there is no room for parties to negotiate volumes, prices, and risk allocation clauses.

Vesting contracts are established to reduce the purchase price risk faced by discos, to provide a stable cash flow to generators, and to promote a gradual transition toward market-based bulk power tariffs.

The transition to bulk power tariffs usually involves a gradual price increase, if vesting contract volumes at subsidized prices are scaled down and replaced by new power priced at market prices or marginal cost. Or alternatively, power tariffs may go down, if there is the need to recover high costs represented by “stranded” contracts.

Automatic or full pass through, both for single buyer purchases and for vesting contracts, is sometimes more of a concept than a reality. It is not uncommon to see a significant lag between when the disco pays higher (or lower) bulk power prices and when tariffs to final customers are increased (or reduced). In Brazil, for example, the lag is mandated by law because of the concern that more frequent tariff adjustments would trigger inflation. Box 1 describes the Brazilian system of automatic pass through and some of the changes that have occurred over the last several years.

A more timely form of automatic pass through existed in El Salvador, whose Electricity Law allowed for annual full pass through of spot prices in the previous 12 months, with adjustments every six months. In theory, the mechanism would protect discos against fluctuations in spot market prices by allowing full pass through of ex post power costs. However, when spot prices become very volatile, with unexpected price increases, a disco may experience a significant revenue shortfall caused by the time lag between actual prices and the prices that are recovered through tariffs.

When generation costs are volatile or are transferred on an ex post basis, they become critical to more frequent adjustments. Otherwise the financial condition of the disco may be seriously jeopardized. But frequent bulk

power price adjustments, especially if they result in tariff increases for the end-user, can cause political and social problems. El Salvador is currently revisiting its pass through arrangements, and is considering the introduction of an equalization fund similar to the Argentine fund to reduce power purchase costs' volatility.¹⁹

Review of Power Contracts

The regulator reviews an individual power contract and makes a judgment as to its “reasonableness” in terms of prices, risk allocation, and other contractual terms. Based on this assessment, the regulator may approve full pass through or prohibit some or all energy costs from being passed on to retail customers—or may decide that certain contract terms be dropped or modified. The government or legislature may also perform an additional review in lieu of one performed by the regulator.

Review of Power Contracts may take place on an ex ante or ex post basis. Ex ante reviews are made to ensure that the contract complies with the electricity laws as well as with contracting guidelines that may have been previously set by the government or the regulator. This is the case in Guatemala, Panama, and Nicaragua, where the electricity laws mandate competitive procurement for the discos, and the power purchase contracts have to be approved by the regulator before the prices can be passed through in retail tariffs.²⁰ Once the contracts are approved, there is a usually a guarantee of full pass through as long as no amendments are made to the contracts without regulatory approval. This was the dominant regulatory approach used during the 1980s throughout the United States.

Pass through of power costs may also depend on an ex post contract review (in other words, one that takes place after a contract has been signed). This usually occurs when there is an allegation of corruption or incompetence in the award of a particular contract.

Ex post reviews are almost always very contentious. They have been conducted, among other places, in California and in the state of Maharashtra in India. In Maharashtra, a new state government challenged the terms and conditions of a power agreement signed

¹⁹ A combination of mechanisms is being considered; the first (a stabilization fund for discos) has been regulated to start operation in June 2003.

²⁰ In Panama, it appears that there is no formal ex post review of contracts. Instead, the regulator reviews for compliance with the competitive bidding rules and contract award processes.

BOX 1. Automatic Pass Through in Brazil: It Is Not What You Say, It Is What You Do²¹

Some Brazilian officials describe their power purchase pass through mechanism for vesting contracts as an example of “full” or “automatic” pass through. This normally means that the regulatory contract provides for frequent and complete adjustments for changes in the costs of power purchases. But in fact, this has not been the case because Brazilian law allows ANEEL, the national electricity regulator, to make adjustments in retail tariffs *only once a year*. The general prohibition on more frequent adjustments reflects a macroeconomic concern that indexing or any regulatory mechanism that mimics indexing (for example, automatic monthly tariff adjustments to reflect changes in power purchase costs) could lead to a new outbreak of the hyperinflation that Brazil experienced during the 1990s.

This economy-wide, legal prohibition on more-frequent price adjustments has created significant financial risk for Brazilian distribution companies. For example, suppose that a disco’s retail tariffs were set on the assumption that the disco’s dollar-denominated debt service and some power purchase costs will be US\$1 million (R\$3 million in Brazilian currency) per month. If the Real declines in value against the dollar by 10 percent, the distribution company will need to pay R\$ 300,000 more per month to cover additional expenditures. However, the retail tariffs are not indexed to the USA dollar and Brazilian law prohibits the discos from adjusting its retail tariffs until the next scheduled annual tariff adjustment. As a consequence, the disco will lose R\$ 300,000 per month. When retail rates are finally changed the following year to reflect the higher power purchase costs, there is no “catch-up” mechanism to recover the money that the company lost every month since the previous adjustment.²² One large distribution utility serving part of the state of São Paulo estimated that it lost about US\$180 million between June 1999 and October 2001 because its automatic pass through mechanism permitted only annual adjustments for cost changes.

There are two solutions to this regulatory lag problem, and both have been adopted in Latin America. One is to have more frequent tariff reviews. The other is to have a *tracking account*, which records tariff shortfall or surpluses and makes up for any differences in the next tariff adjustment process. Tracking accounts started to be used in Brazil in 2001 and they have proved to be a satisfactory solution for discos’ regulatory lag. More recently, as part of an effort to limit tariff increases, the government ordered that the 2002 generation cost increases that had been accumulated in the tracking account would be deferred and transferred to tariffs over several years, rather than being fully recovered only in 2003.

Tracking accounts are not without problems, however. They can lead to significant tariff increases at the time of the next adjustment.²³ Furthermore, until tariff adjustments are made, a disco could experience significant cash shortfall. Nicaragua’s Tariff Normative tried to deal with the first problem by creating a pre-specified “trigger” point, which would “empty” the account once it reached a predetermined level.

between the Maharashtra State Electricity Board (MSEB) and Dabhol Power Corporation (DPC)²⁴ for electricity sales from the Dabhol project.²⁵ To date, the issues in dispute have still not been resolved. In California, the state government forced the Department of Water Resources (DWR), the state agency that acted as a single buyer on behalf of the government, to renegotiate the

high prices of energy contracted during the peak of the California energy crisis. This was triggered by widespread allegations that DWR had purchased power from sellers that had manipulated the market to raise prices.²⁶

²¹ The discussion in this box draws from Bakovic, Tenenbaum, and Woolf (2003, p. 30).

²² This problem is not unique to Brazil. It is usually referred to as “regulatory lag” and has to do with cost variations between two successive tariff adjustments. If differences between forecast and actual costs are substantial—for instance, when currency devaluations take place—the regulatory lag may have a significant impact on a disco’s financials.

²³ The financial risk of regulatory lag is not completely eliminated with the creation of an administrative tracking account. Experience has shown that if recovery of past revenue shortfalls lead to a sharp tariff increase, the government or the regulator will try to smooth out the impact, by deferring recovery over multiple periods.

²⁴ DPC is a subsidiary set up by Enron Corporation and its affiliates, Bechtel and General Electric of USA.

²⁵ Parikh (2001) provides a detailed explanation on the nature of the contractual dispute.

²⁶ The implications of this on pass through of power costs are still unknown. To date, the state of California has absorbed part of those costs, increasing its fiscal deficit. The proportion of costs to be passed through to customers is still uncertain at this point; however, it is expected that the taxpayer will probably end up absorbing a large portion of the contract-stranded costs.

In commenting on ex post reviews in an earlier period, one California energy company official observed that such reviews were “time consuming and frustrating, and left everyone angry because no one got what they wanted.”²⁷ A long-time California consumer advocate described the “retrospective reasonableness reviews” as counterproductive and ultimately harmful to consumers because they create strong incentives for the disco to make purchases “to avoid regulatory disallowance rather than try to minimize costs.”²⁸

In general, ex post reviews are undesirable because they tend to focus only on extreme examples of incompetence and inefficiency, provide no penalties for failure to adopt best practices, offer no rewards for superior performance, and tend to drag on and on. In the case of developing countries, these reviews also reduce contract certainty and may hurt contract sanctity at the very times when the country needs to demonstrate both of these characteristics to international and domestic investors. Ex post reviews should be used only if there is clear evidence of pervasive corruption, major commercial malpractice, or legitimate “acts of God.” Given the likelihood that this kind of review may be motivated by political considerations, it should be seen as a “last resort.”

Administratively Set Benchmarks

According to this methodology, the regulator tries to define a “reasonable” cost for power purchases using administratively established estimates of investment and operating costs. These estimates are then used to establish a benchmark and the buyer is allowed to pass through prices up to the benchmark. This was the approach taken during the early years of implementation of the PURPA Law (1978) in the United States. The law required USA utilities (which were generally vertically integrated) to buy the output of certain types of independent generators known as “qualifying facilities” at a price equal to “avoided cost.” The avoided cost was deemed to be a fair and reasonable price, and any power purchases made at or below the avoided cost was automatically passed through to the buying utility’s retail customers.

Usually the avoided cost was calculated based on an estimate of the utility’s cost of providing the same increment of supply if acquired from some other source (for example, own construction or sources that did not qualify under the PURPA Law). The avoided cost estimates were determined in formal regulatory proceedings. A state regulatory commission would receive evidence from various parties and then decide on a “reasonable” number. In some cases this adversarial process produced very high estimates of avoided cost, particularly if the commission was under pressure to encourage nontraditional suppliers of power.

For example, in the 1980s the California Public Utility Commission required California utilities to sign multiyear contracts with qualifying independent power producers at prices that were based on the Commission’s expectation that world oil prices would remain at above \$30 a barrel for many years. Shortly after the mandatory contracts were signed, world oil prices collapsed. But the contracts mandated by the regulator continued to be honored and it is estimated that California consumers ended up paying several billion dollars above actual market prices. As a result of this experience, many commissions later moved toward estimating avoided cost prices using a mandated auction mechanism.²⁹ This meant that avoided cost prices were the outcome of a market rather than an administrative process.

Brazil has taken a similar approach. ANEEL currently makes administrative estimates of long-run marginal cost (LRMC) known as Normative Values (or VNs). Regulations require that every disco’s power purchase agreement be assigned a separate VN which is then indexed to various measures of inflation. It is an administratively cumbersome system. Moreover, there has been considerable controversy surrounding the economic and operating assumptions used to calculate the benchmark. Not surprisingly, generators and discos have argued that the numbers are too low. Discos have complained that no power producers were willing to sell at the benchmark prices established by ANEEL. Even some independent observers have concluded that the gap resulting from Administratively Set Benchmarks and

²⁷ “When the regulator looks at the purchasing strategy of the Disco with hindsight there will always have been a better way.” Hunt (2002, p. 51).

²⁸ As quoted in Bakovic, Tenenbaum, and Woolf (2003, p. 36).

²⁹ In the United States, the Federal Energy Regulatory Commission (FERC) proposed general rules for a standardized competitive bidding process. However, the rules were never formally issued because of political opposition. A good description of the US efforts to implement PURPA can be found in Plummer and Troppman. (1990)

the real market cost of power has been a deterrent to capacity expansion in the country and contributed to Brazil's supply shortages during 2001–02. To resolve this impasse, the Brazilian government announced in late 2002 that it would replace VN with a market determined benchmark within a year.³⁰

Mandated Competitive Procurement

According to this methodology, the regulator requires discos to buy some or all of their energy requirements through a competitive and transparent procurement process. This is a kind of “conduct” regulation. The hope is that if the distribution company follows the specified processes, this will lead to cost-effective purchases. As a *quid pro quo*, the regulator usually commits to allowing full pass through of the purchase costs to the distribution company's customers.

Mandated procurement can be required of either physical or financial contracts.

Physical Contracts

Physical contracts are usually employed in “bilateral markets,” where the buyers are vertically integrated utilities or separate distribution entities and the sellers are independent generators or marketers. Physical contracts give the buyer an entitlement to energy produced by one or more generating units. Physical contracts require that there be an electrical connection or at least a contract transmission path between the seller and the buyer.³¹ Depending on the specifics of the agreement, the seller (or the buyer) may have the right to determine how the generation unit or units will be dispatched (or self-scheduled) rather than ceding this decision to a central system and market operator. A type of mandated competitive bidding for physical contracts

for new supplies was recently adopted in Florida in the United States (see box 2). This action seems to have been principally motivated by a desire to create a “level playing field” between competing bids of affiliated and nonaffiliated generators.

The fact that a regulator has mandated a competitive procurement is no guarantee that there will actually be adequate competition. This is true regardless of whether the procurement is for a physical or financial contract. Competition may be inadequate whenever there are barriers to the construction of new plants or insufficient capacity on the transmission grid to deliver the energy once the plant has been built. In addition, there may not be many sellers who are willing to make actual offers when there is uncertainty about whether the disco has the ability to pay or when there are regulations that limit the pass through of power purchase costs to retail tariffs. A number of developing countries have experienced these problems. In some cases a procurement is announced but few, if any, generators come forward with actual offers—a problem that is not limited to developing countries. A similar situation occurred in California in 2001 when generators and other suppliers began to doubt that the buying utilities in the state would have the financial capacity to pay for purchases. When generators refused to sell to the privately owned utilities, the state of California was forced to purchase on their behalf and also issue state-backed bonds to guarantee payment.

Financial Contracts

In contrast to physical contracts, a financial contract provides a financial hedge between a seller and a buyer for a specified amount of energy during one or more hours at predetermined prices. The buyer usually does not care where the power comes from; the only

³⁰ When Brazil established its pass through methodology in 1998, it was meant to be based on a market benchmark. It was assumed that the reform process and implementation of the wholesale market would be finalized during 1999–2000 and market benchmarks would be available soon. Owing to delays in market implementation, regulators lacked a market proxy to set a benchmark for pass through purposes. In the absence of any reasonable proxy, an administratively set benchmark (VN) continues to be applied. A benchmark based on the contract market would be the preferred choice, as market conditions permit. Decree 4.562, on Article 11, 12, and 13 (December 31, 2002) has ruled that ANEEL should migrate to a benchmark based on energy auctions within one year.

³¹ Physical contracts are based on the “wheeling trading model.” The fundamental problem with this trading model is that it assumes “that the power [can] be directed to follow a particular [contractual] path on the network, in breach of physical laws that dictate the flow of the electricity.” The experience of the United States and Europe shows that this trading model has problems when there are many participants and many transactions. See Hunt (2002, pp. 143–47). It appears that India's new electricity law will also be creating a wheeling trading model. A pool using financial contracts can deal with multiple transactions in a simpler way, provided a proper metering and settlement system is in place.

BOX 2. Mandated Competitive Procurement: Physical Contracts (Florida, USA)

Four large vertically integrated utilities under private ownership provide most of the electrical service in Florida. Historically these four utilities have built and operated their own generating units with some limited imports from neighboring utility systems to the north. During the last several years, independent power producers (IPPs) have complained that these four utilities have designed a procurement process for new generation supplies that always results in the utilities' building their own new generation (in other words, a self-build option). The IPP developers have argued that this is unfair and results in Florida retail consumers paying more for new generation than they would if the IPP developers were given an equal opportunity to compete for the right to build new generating units. After more than three years of political and legal battles, the Florida Public Service Commission (PSC) issued the "New Bid Rules" in January 2003 with the intent of creating a "level playing field" between the "self-build" option and competing power sale proposals from IPP developers.

The "New Bidding Rule" specifies the following:

- Information required in the request for proposals (RFP)—the rule mandates more than 25 information items, including some with several subcomponents, that the utility must provide;
- Information that must be provided by bidders;
- Procedures for bids by the buyer (the "self-build" option);
- Procedures for holding meetings between the buying utility and potential bidders;
- Procedures for filing complaints before and after selection;
- Type of evidence that can be used in complaint proceedings;
- Procedures if the purchasing utility wishes to make any changes in the RFP after it has been issued;
- Standards for judging whether additional "extraordinary costs," incurred by the utility if it chooses the self-build option, have been "prudently incurred."

The focus of the "New Bidding Rule" is clearly on conduct regulation. It will require heavy and detailed monitoring of how the integrated utilities conduct their procurements to ensure that they comply with both the "letter and spirit" of the new rule. This monitoring by the commission is made more complicated by the fact that the final signed contracts will be for physical delivery rather than for a specified price, which means that the selection criteria must be multidimensional instead of having a single dimension—a price. Because the final selection will be based on a weighting of price and non-price criteria, it will be more difficult for the Florida commission to assess whether the buying utilities acted impartially than if the selection were based solely on price (see box 3 on Panama and box 4 on New Jersey).

The "New Bidding Rule" is designed to ensure that the purchasing utility selects the least cost option, whether it is the "self-build" or "purchase" option. However, it appears that there is a fundamental conflict between the detailed regulations of the "New Bidding Rule" and Florida's existing cost-of-service system. Under cost-of-service regulation, a utility can earn a profit on any electricity that is produced from its own generating units because the capital cost of the new generating unit goes into the utility's "regulatory asset base." But if the utility purchases the same amount of electricity from a third party, it is not allowed to earn a profit on the purchase cost (that is, the transaction is simply a cost pass through of an expense item). Therefore, regardless of what the regulations may say in the "New Bidding Rule," the buying utility will always have a strong incentive to "build rather than to buy."

A possible course of action would be to change the tariff setting system so that the utility can earn profits on both the "buy" and "build" options. Presumably, if a utility had comparable incentives to buy or build, a commission would not have to spend so much time trying to police the utility's behavior. Instead, the regulator would be able to focus on outcomes rather than processes.

continued

BOX 2. Mandated Competitive Procurement: Physical Contracts (Florida, USA) - continued

Conduct regulation is a second-best regulatory solution because it is labor intensive, slow, and susceptible to legal challenges. It forces a commission to specify and then police relatively minor (but important) procurement actions. In Florida, some IPPs' argued that the procurement process mandated by the "New Bid Rule" could be successfully implemented only if an outside third party not affiliated with the purchasing utility conducted it.³² The PSC rejected this option but it may still make sense for countries where the regulator is new and inexperienced and where corruption (for instance, bribes from a generator to the distribution company that is procuring new generation) is a concern.

assurance sought is for the seller to honor the agreed-upon price. In an electricity market that operates as a pool or has a spot market, the seller may cover the contract quantities with its own generation, through previously acquired contracts, or purchases in the spot market.³³ Financial contracts are simpler to implement and settle than physical contracts.³⁴ However, they are not feasible unless there is a functioning pool or a spot market that handles the day-to-day and hour-to-hour balancing and settlement process of spot trading.

Mandated competitive procurement for financial contracts has been adopted in most countries in Latin America. Any deviations between a disco's actual consumption and the total amount contracted in financial contracts is settled using spot market prices. If the total amount contracted is less than the disco's actual consumption, the disco must buy the shortfall in the spot market. And if the contracted amount is more than actual consumption, the disco can sell the surplus in the spot market.

The Panamanian Approach

Within Central America, Panama has the most experience with this approach. At the outset of the reform process, the country created a principal buyer model,³⁵ which served as an intermediary between discos and sellers. The Transmission Company acted as

the principal buyer and had the responsibility of preparing and organizing tenders for competitive contract procurement on behalf of the discos, under the supervision of the regulator. Box 3 describes Panama's efforts to create a mandated competitive procurement using financial contracts.

The New Jersey (USA) Approach

The state of New Jersey in the United States has used a somewhat different approach to financial contracting, as described in box 4. In the New Jersey procurement, generators (or marketers) bid for the right to provide "tranches" of power to serve the needs of a particular market (or markets). The winning bidder is the one able to provide power at minimum price. Contrary to the Panamanian case, the process does not involve the output of a particular power plant.

The rationale to establish this mechanism derives from the introduction of full retail competition in some markets that are at the late stages of the reform process. In those markets, every final customer has the legal right to buy from an alternate supplier. This is the case in New Jersey. However, very few retail customers have actually exercised this right. As a consequence, some entity must be designated to operate as a "default supplier" or "supplier of last resort" for the power needs

³² Makler and Schleimer (2003, p. 33).

³³ If the market design includes mandatory centralized dispatch, the decision as to which power units are actually committed and dispatched will be made by a pooling organization (that is, a "system operator") responsible for centralized dispatch. The system operator will not be a party to the transaction.

³⁴ Depending on the wholesale electricity market design, the spot market trading may operate as a "gross" pool, whereby all the energy sold and bought is settled at spot price and players set contracts for differences (CfDs) to hedge against spot price volatility. Or alternatively, the spot market may operate as a net pool, where only the differences between contracted and physically metered quantities are settled at spot market price. In the absence of taxes, those mechanisms produce the same results in terms of unit commitment, determination of spot prices, and provision of financial hedges to the contracting parties. In either case, we refer to these contracts as financial instruments.

³⁵ Contrary to the traditional single buyer model, the principal buyer in Panama was responsible for procurement of a significant part of the energy in the system, but technically it was not the single buyer. The disco had the right to procure on its own up to 15 percent of its load. This system was designed to create some competitive pressure on the principal buyer. Contractual obligations were set directly between the generator and the discos, and the principal buyer had no liability in case of non-payment or disputes on terms and conditions of the power contract.

of these customers.³⁶ In the absence of a geographic franchise, this entity does not necessarily have to be the traditional distribution utility. On the contrary, some authors believe that the distribution utility should be prohibited from serving those potentially free customers. There is an understanding that “if providing default services becomes profitable, discos might use their distribution assets to stifle competition in the retail

market.”³⁷ The challenge becomes providing services to those customers in the most economic way, while fostering retail competition.

Different markets have dealt with the issue of default supplier differently. The regulator in New Jersey has established a mandated competitive procurement by all distribution companies, run by third parties, for the right

BOX 3. Mandated Competitive Procurement: Financial Contracts for Captive Customers (Panama)

Regulators sometimes mandate discos to acquire their energy needs via a competitive procurement process, in order to introduce some form of competition in the wholesale market. Prices resulting from this process are then passed through to retail customers. This is particularly important in small, illiquid power markets, to ensure maximum transparency, to create a level playing field, and to attract new investments by offering long-term contracts to power developers.

Panama is one of the countries in Latin America where there is a mandated procurement process, with an initial transition procurement carried out by a principal buyer. The discos have the obligation to contract the expected load to serve their captive market, which is not covered by their own generation.³⁸ The rationale is that this will facilitate new investments and ensure sufficient generation capacity to cover peak loads. Discos have the right to transfer the power purchase costs that result from the competitive procurement process to retail tariffs, as long as they follow the guidelines approved by the regulator, who reviews and authorizes the process on an ex ante basis. The regulator can provide waivers to the contracting obligations if there is insufficient competition. In this situation, the regulator can authorize a disco to buy energy in the spot market and capacity in the centralized daily capacity market and transfer both costs to tariffs.

To enforce the obligation to contract competitively, procurement obligations were defined on three levels:

- (a) The Electricity Law stated that 100 percent of a disco’s load should be met by competitive procurement. If the disco followed the guidelines, full pass through would be granted;
- (b) The Market Rules assigned the obligation of load forecasting using data submitted by the discos to the System and Market Operator located within the Transmission Company. The Market Rules also provided details on load forecast calculations, volumes to be contracted, type of contracts, and roles of the regulator in supervising and approving the tender process;
- (c) The regulator issued detailed rules on competitive procurement—both in terms of the tender process and the general design of contracts.

According to the procedures set forth by the regulator, discos were required to call the tender several years in advance of actual need in order to maximize competition from both existing and new generators with green-field power plants.

continued

³⁶ This nomenclature is not an industry standard. We follow a definition provided by Hunt (2002). Provision of Last Resort (POLR) applies to clients that are not attractive enough to other suppliers or when no other suppliers are available; Provision of Default Services refers to other clients that could have shifted suppliers, but preferred not to do so—because of inertia, economics, or threat of retaliation from the incumbent.

³⁷ Blumstein (1999, p. 3).

³⁸ As noted above, disco is allowed to cover up to 15 percent of its customers’ load with its own generation. However, even for these purchases, the discos are bound by competitive procurement rules.

BOX 3. Mandated Competitive Procurement: Financial Contracts for Captive Customers (Panama) - continued

The first application of the new procurement rules took place in 2002 when the principal buyer was still responsible for centrally administering the competitive procurement for most of the power in the country. It took months of debate for the regulator and the discos to agree on the detailed design of the tender and on the contract's terms and conditions. Some of the complexity in the procurement process was caused by the fact that the Transmission Company was a government entity and it therefore had to comply with general government procurement rules. It was a learning experience for the electric sector as a whole. The experience with these initial procurement guidelines showed the need for changes in the guidelines. After a consultation process, the regulator announced some changes to be effective in subsequent tenders. The most important amendments were as follows:

- Allowed generation owned by a disco to participate in tenders of others discos;
- Clarified principles on contract design: Contract should have an appropriate allocation of risks between the parties and should not contain too many restrictions, penalties, or transfer of risks to generators, which might lead to excessive contract prices or make the contract unattractive to existing or new generators (and thereby reduce competition and create barriers to entry);
- Increased the maximum volume that can be acquired in each tender;
- Required each bidder to present an offer for the entire duration of the required contract. Initial procurement rules allowed bidders to present offers for only a portion of the service period proposed in the tender contract;
- Established that each bidder should present an offer (quantity, prices) and also prices if such quantity were to be reduced. The purpose was to allow participation by small generators. Therefore, bidders could present an offer for a portion of the quantity required and the disco could award several contracts that, taken together, added up to the required quantity.

The regulatory approval process has become faster but there are still problems in the underlying contract design. There is a general perception that discos tried to shift too many risks to generators. The most controversial issue has been the profiling of contract quantities over time. Instead of establishing a fixed quantity or quantities related to actual load, the contracts sometimes called for a reservation of capacity and gave the disco the option of deciding how much of the associated energy it would take from the generators during specified periods. For example, a disco may call for very little of the energy associated with the contracted capacity if it can satisfy its energy needs at lower spot market prices. In a predominantly hydroelectric system such as in Panama, where most of the costs are fixed, giving this option to discos may entail an important risk for generators. To offset this risk, generators have bid high capacity prices in the tenders. In effect, the generators are trying to earn profits in their capacity charges—profits that might otherwise have been earned in energy sales. Efforts to cap contract prices in the tender to protect regulated customers have also been controversial, as there is a strong relationship between risks allocated to the generator in a contract and the costs that the generator needs to cover to accept such risks. The regulator has been trying to reach a balance between risk allocation in contracts and cap prices, protect end consumers, and at the same time attract new investors. New tenders are planned for the second half of 2003.

The principal buyer is a transitional arrangement. The Electricity Law defined an initial five-year transition period, during which the model evolved toward a multiple buyer and multiple seller market.

to operate as a default supplier. Consequently the “wires” and “marketing” functions are completely unbundled and presumably all customers will benefit from maximum competition in the provision of power to meet their needs. In principle, costs of power paid by discos to the default suppliers are a full pass through

element in their cost structure, if procurement guidelines set by the regulator are followed strictly.

Box 4 describes how the procurement for the role of last provider has been established in New Jersey.

BOX 4. Mandated Competitive Procurement: Financial Contracts to Serve Retail Customers (New Jersey, USA)

The four discos in New Jersey were required to assume the role of default supplier for the first two years following the introduction of retail competition. However, starting in the third year, the state's reform law required that the discos acquire the electricity for their default service (known in New Jersey as the "basic generation service") through a competitive auction. In other words, how they fulfilled their role as default providers was no longer left open to their discretion.

To date, there have been two such auctions. The second auction, held in February 2003, attracted 20 bidders that competed for the right to supply about 18,000 MW of capacity and associated energy with an estimated value of \$5.2 billion dollars. The procurement was conducted over the Internet using a type of auction known as the "clock auction," which involves multiple bidding rounds in which prices tick down until the amount of energy supplied equals the amount of energy sought. Bidders bid for the right to serve 2 percent shares of the residential, commercial, and industrial loads of each of the four discos for periods of either 10 or 34 months. It is anticipated that in the future, the right to serve one-third of each disco's retail load will be subject to competition every year. The winning bidders will assume a one-year supply obligation.

The bids for the residential and commercial loads were not time differentiated while the bids for the large industrial customers were time differentiated. The actual auction process was conducted by NERA, an economic consulting firm whose services were paid for by the distribution companies. The winning bids are not, however, final prices to customer. Each of the distribution companies adds a "distribution margin" to the bids received for generation service. More complete information on the 2003 auction can be found at <http://www.bgs-auction.com>

Several observations about New Jersey's mandated procurement follow:

First, the distribution companies do not take title to the power. They are acting as agents for those retail customers taking the default service as opposed to the discos' more traditional role as buyers and resellers of power. Under a more traditional form of disco procurement, a disco will seek competitive bids for specific portions of its supply needs and it will take title to the electricity that is supplied by any winning bidders.³⁹ Perhaps the most important implication of this difference is that New Jersey discos bear less risk than other discos that take full title for the energy and therefore bear all quantity and price risks.⁴⁰ However, in both New Jersey and traditional procurements used elsewhere, the discos continue to bear the risk of nonpayment.

Second, even though the New Jersey utilities proposed the form of the procurement, they did not conduct the procurement. As noted above, the actual procurement was conducted by an outside consulting firm that specializes in auction design. To ensure objectivity, the commission hired another consulting firm to review the design and implementation of the auction. In contrast, the regulator in Panama supervised the process, but the actual procurements were conducted by each of the distribution companies.

Third, in New Jersey at least three of the winning bidders were affiliates of the discos. Yet there have been no allegations of unfair favoritism toward these bidders. Presumably this reflects the fact that the actual auction was conducted by a third party and the winners were selected solely on the basis of their willingness to supply financial contracts at particular prices rather than the more subjective combination of price and non-price criteria required for evaluating physical contracts (as is the case in Florida, described in box 2).

continued

³⁹ In the particular case of Panama, discos were able to transfer a large part of quantity risks to generators, by defining contract volumes as a percentage of metered load. Also, in some contracts quantities are scaled down if free customers (that is, non-captive customers) shift suppliers and stop buying energy from the incumbent disco. This does not necessarily represent an efficient risk allocation for the market as a whole, since it shifts risks to generators, which may not be in a position to manage those effectively.

⁴⁰ Quantity risk has to do with demand being greater or smaller than anticipated. This may be due to forecast errors on demand growth, or the effect of retail competition on the sales of the incumbent utility or disco.

BOX 4. Mandated Competitive Procurement: Financial Contracts to Serve Retail Customers (New Jersey, USA)
- continued

Fourth, the New Jersey distribution companies are also subject to a retail price cap until July 31, 2003 so they cannot automatically pass through the results of the auction to their customers. If the overall costs (distribution margin plus power purchases) incurred before July 31, 2003 go above the retail price cap specified in the New Jersey reform law, the “extra” costs are deferred (that is, put into a tracking account) for possible recovery sometime in the future. Therefore the New Jersey system, at least until July 31, 2003, is really a combination of three regulatory tools: mandatory competitive procurement to supply customers that choose not to select an alternative supplier, a mandatory retail price cap, and an after-the-fact review of the “prudence” of all costs that exceed the price cap. Even though the commission could disallow power purchase costs, it seems unlikely since it gave its approval to the results of the first auction a few days after it was completed in February 2002. Starting August 1, 2003, the price cap will be removed and the auction prices will be automatically flowed through to the disco’s retail customers. This modification will provide a better linkage between the wholesale and retail markets.

Fifth, while this type of competitive auction was tied to serving captive customers, it could also be used in situations where there is no mandatory retail competition. Even in the absence of retail competition, a regulatory commission could mandate that a distribution company conduct an auction to serve some or all of the energy needs of its captive retail customers. In this sense the New Jersey auction provides one way to get some of the benefits without the hardware and software costs of a full-scale system of retail competition.⁴¹ The New Jersey auction system is a form of “retail competition-lite” in that there is competition to serve retail customers but without the need to incur the costs of marketing, education, and settlement systems. Even though the state’s retail customers are technically being supplied by four to six separate suppliers, these customers generally do not know (or care) who is supplying them with energy. What is lost in the auction is the possibility that a retail service provider could provide other “value-added” services if it had direct contact with retail customers. However, there is nothing in the auction design that would prevent a winning supplier in the auction from also being a full-service retail provider.

The New Jersey procurement process has generally produced good results because it was built on a platform of a well-designed and highly competitive regional power market. Potential suppliers can draw on resources from the entire six-state-region and beyond, rather than just from New Jersey. The possibility of drawing on supply sources from a larger region could conceivably be replicated in Panama in the future, if the Central American electricity power market, which started operating in November 2002, enables discos and other buyers in the six Central American countries to procure energy from any place in the region.⁴²

Market Benchmarks

These are benchmarks based on the price of power traded between generators and discos in the contract or spot markets. Regulators will establish one or more

market benchmarks as a baseline for assessing a disco’s power purchase costs. If a distribution company is able to acquire energy at a price below the established benchmark(s), it retains all or part of the difference, as an incentive to good procurement. Conversely, if the company pays more than the benchmark it bears all or part of the additional costs (in other words, is not allowed to recover these costs through tariffs.) A benchmark mechanism better aligns the interests of the shareholders with the interests of the customers because they both benefit from lower prices. Such incentives do not exist when the regulator automatically allows the disco to pass through its power costs just because it complied with the guidelines for a specified procurement process.

Benchmarks can be based on the spot prices, contract market prices,⁴³ or a combination of both. In using benchmarks, *the underlying assumption is that the*

⁴¹ See Hunt (2002, pp. 220–36) for a discussion on the costs of setting and operating full-scale retail competition.

⁴² There are plans to strengthen and increase transmission capacity in the regional electricity market.

⁴³ For the purposes of this paper, the “contract market” includes ex ante power agreements of any duration between market participants. “Spot market” encompasses transactions that are settled by a centralized system at the prevailing spot price. Spot prices may be differentiated on a location basis—either as a region (zonal) or nodal (each electric node at which the market participants are connected), depending on the market rules adopted by each country.

discos being compared are buying the same product. However, this may not be true if one disco has a significantly different load pattern from others. For example, if one disco has a more “peaked” load shape, it will have to buy more expensive peaking power. If its power purchase costs are compared to a disco that serves a flatter load curve, it will always look worse. The problem with any benchmark is that no discos will ever be exactly the same. The regulatory judgment that has to be made is whether the differences are so large that it would be unfair to use the benchmark or whether the benchmark requires further adjustments.

Some of the power purchase benchmarks that have been used in different countries are described below.

Spot Market Prices

This benchmark is based on spot prices, sometimes referred to as reference prices.⁴⁴ The latter are used as a reference for the pass through decisions of power purchase costs in regulated tariffs to final customers. Spot prices may be computed on an ex ante (predicted based on expected conditions) or ex post (actual observed) basis.⁴⁵

The spot prices used in the benchmark may be differentiated by hour, day, month, and season. For pass through purposes, there is typically one reference price for peak, shoulder, and valley loads in the smoothed (averaged) period (one or more months). The generation pass through price at the wholesale level is transferred to final customer tariffs if retail customers have interval meters—or through a load profile if interval meters are not available.

Locational differentiation may take into account marginal losses (variable transmission costs).⁴⁶ Therefore in a single country or region there may be as many spot prices as nodes in the transmission system. The spot reference price for a given utility will then be an average of the spot prices in all the nodes from which it draws energy from the transmission system.

In the Latin American countries analyzed for this study, nodal prices for pass through purposes are calculated using some simplifications while trying to preserve, as much as possible, the dimensions of location and time. Spot prices are usually calculated first for a reference node and then adjusted to the node(s) of each disco using loss adjustment factors. As a result, different benchmarks are calculated for each disco, taking into account marginal losses (and congestion in the case of Argentina and El Salvador) with respect to the reference node.⁴⁷

Regulators may make further adjustments to estimates of ex ante spot prices. They will sometimes apply an adjustment to reduce volatility or to tie the estimated spot prices to prices of non-regulated transactions between market participants. For example, in Chile and Peru, ex ante reference prices are compared to the average prices in an unregulated contract market. The spot prices used for pass through purposes are not allowed to diverge from the contract prices by more than 10 percent.

Spot Price Calculation

Table 2 summarizes the methods used to calculate spot price benchmarks in five countries in Latin America.

⁴⁴ We define spot prices as actual prices in the spot market. On the other hand, reference spot prices are averages of forecast or actual spot prices. The averaging period may vary from three months up to more than three years. The purpose of averaging is to smooth the impact of spot price volatility on tariffs to final customers. Reference spot prices try to preserve, as much as possible, the dimensions of location and time. Usually, reference spot prices are calculated for a specific node and then adjusted to the node(s) of each disco using loss factors and in some cases congestion costs. As a result, different benchmarks (and reference prices) may be applied to each utility.

⁴⁵ The statement refers to the calculation of spot prices for pass through purposes only. It has nothing to do with their calculation for energy settlement purposes in the spot market. For example, Argentina determines ex ante, three-month smoothed out reference prices for pass through, but spot energy settlement for market participants takes place with ex post, hourly spot nodal prices.

⁴⁶ We are not including any differentiation due to Transmission Use of System Charges, which are usually part of the fixed costs of the transmission network (“wires”), and therefore treated as full pass through components. Marginal losses refer to the energy (MWh) lost in a transmission line of a given voltage and are proportional to the square of the power flow (Ohm’s Law). Most power pools take these losses into account, and calculate them for each node of the system. Congestion costs on a transmission network exist because there is a need for load to be shed or more expensive generation to be dispatched on the downstream side of a transmission constraint (caused either by thermal limit or potential overload).

⁴⁷ Prices that take into account both losses and congestion are usually known either as locational marginal prices (LMP) or “nodal prices.” Most power pools in Latin America do not differentiate prices by node based on congestion. Some of them differentiate on a zonal basis, (for example, Brazil) while Argentina and El Salvador differentiate on a nodal basis.

Table 2. Pass Through Benchmarks Based on Spot Prices

COUNTRY	EX ANTE OR EX POST	PRICE SMOOTHING-OUT PERIOD	LIMITS OR ADJUSTMENTS MADE BY REGULATOR?	OBLIGATION FOR DISCOS TO CONTRACT?
Chile	Ex ante	Next 48 months, calculated every 6 months	Yes. Benchmark is adjusted if it differs by more than +/- 10% from the average contract prices paid by large customers in the free market	Discos can only buy via contracts; they are not allowed to buy in the spot market
Peru	Ex ante	Next 48 months, calculated every 6 months	Yes. Benchmark is adjusted if it differs by more than +/- 10% from the average contract prices paid by large customers in the free market	Discos can only buy via contracts; they are not allowed to buy in the spot market
Bolivia	Ex ante	Next 12 months, calculated every 6 months Further monthly adjustments sometimes used	No	Discos obliged to cover 80% of supply needs via contracts with duration > 3 years. To date, no contracts have been signed
Argentina	Ex ante, with ex post adjustment	Next 3 months, with adjustments for the previous 3 months, and calculated every three months	No. Discos buy spot at a seasonally stabilized energy price that is also the reference price transferred to tariffs. Differences between actual spot prices and prices paid by discos are covered by a special fund, administered by the System and Market Operator	No contracting obligations
El Salvador	Ex post	One year (12 months) average adjusted every 3 months. Shorter periods down to one month have been used, to mitigate the tariff lag impact.	No	No contract requirements

Ex Ante Calculations

On an ex ante basis, regulators (or system operators) forecast energy spot prices, which are differentiated by location and time of day and usually are smoothed over a period of several months. This has been the method used Chile, Bolivia, and Peru. The calculation depends on assumptions about system expansion, fuel prices, availability and hydrological conditions.⁴⁸ Such projections are inevitably controversial. The longer the time horizon, the more controversial are the predictions. The estimates are usually made by the regulator or by the system operator, whose decisions may be influenced by the

government. Since the assumptions are “in the eyes of the beholder,” the projections can be manipulated by those in charge of forecasting reference spot prices.

In the countries of Latin America that use only ex ante spot price benchmarks, the electricity law usually imposes an additional requirement that discos sign contracts for their energy needs. Spot price estimates are used as a reference for the allowed pass through of power purchase costs but the actual purchases must be made in the contract rather than the spot market.⁴⁹ The presumption is that such contracts are needed to get investments in generation and that discos will

⁴⁸ Assumptions on the introduction of natural gas have had a significant impact in the ex ante spot price calculations in both Chile and Peru.

⁴⁹ There is not a uniform definition on the duration of a power agreement to satisfy the minimum contracting requirement. There may be different interpretations of how long medium- and long-term durations should be. In Guatemala and Panama, a contract must have a duration of one day or longer, but discos must contract for longer durations. Typically, all contracts proposed in competitive procurement have a duration of one year or more to qualify as long term.

not enter into such contracts in the absence of a regulatory requirement.

In Chile and Peru, generators can buy and sell in the spot market, but discos are prohibited from buying.⁵⁰ Chilean and Peruvian discos are obligated to acquire 100 percent of their energy needs through contracts. In Bolivia, there is an explicit minimum contract requirement that is set equal to 80 percent of the disco’s supply needs, but discos are allowed to buy any shortfall in the spot market. Despite this requirement, to date, no contracts have been signed in Bolivia and the minimum contract requirement has proved to be difficult to enforce.⁵¹

Ex Post Calculations

In El Salvador, the Electricity Law states that discos are allowed to pass through the observed average spot prices, regardless of the actual mix of their power purchases in the spot and contracts markets. Unlike Chile, Peru, and Bolivia, there is no minimum contracting requirement for discos.⁵² The mechanism has a built-in lag between the time when spot prices paid by the market participant are set and when the average spot prices are transferred to the final customers. Owing to price increases and higher volatility, the government has tried to minimize the effect of the tariff lag. Smoothing periods were reduced to one month in some cases. The recently modified electricity law established a regulatory lag period of six months between successive adjustments of power costs incurred by discos. The new law also allows the pass through of contract prices produced by competitive procurements as a further inducement to attract new investments in generation. However, there is no obligation imposed on the discos to procure energy competitively.

One possible problem with El Salvador’s use of a benchmark tied to actual spot market prices is current industry structure, in which two generation companies

control more than 60 percent of the country’s power generation sources. Based on the experience of other countries, this high degree of seller concentration creates the distinct possibility of generators raising prices though the exercise of market power. If this happens, the discos will benefit from an artificially high power purchase benchmark that they can easily beat and make profits on their power purchases. However, these profits will probably not reflect their competence as proficient buyers. Both discos and generators may have reinforcing incentives to see high spot prices. This suggests that a power purchase benchmark tied to spot prices is undesirable, if the market is highly concentrated and generators have the capability to manipulate spot prices.

The Price Volatility Concern

Spot electricity prices may be extremely volatile.⁵³ A regulatory mechanism based solely on pass through of the price of power in the spot market could lead to volatile prices for retail customers, which would be politically unacceptable. The issue then becomes one of dealing with this volatility in the prices experienced by retail customers.

Some observers have argued that spot prices in the wholesale market should be transferred, if possible on a real time basis, to the final customer. They contend that this would provide a better linkage between the wholesale and retail markets, forcing customers to react to price fluctuations.⁵⁴ These observers contend that this linkage provides an effective way for customers to fully capture the benefits of wholesale competition and create demand response to mitigate generators’ market power.⁵⁵

Others have argued that retail customers should not be forced to see spot prices on their bills. They contend that there is little point in trying to send price signals if the customers are not able to respond to these price

⁵⁰ There is not a *quid pro quo* regulatory obligation imposed on independent generators to contract. Under some special circumstances, generators prefer to sell energy in the spot market.

⁵¹ Please refer to chapter 5 on minimum contract requirements and their enforceability in Latin America.

⁵² Recent increases in spot prices have challenged the existing pass through mechanism. As seen in California, full pass through of power purchases in the spot market may entail a lot of volatility for customers and becomes politically difficult, particularly in periods of high spot prices. In contrast to the situation in California, discos in El Salvador were allowed to hedge volatility by signing contracts. Despite the absence of minimum contract requirements, about 70–80 percent of the energy delivered by discos was contracted, while the remaining part was acquired in the spot market.

⁵³ Spot prices in cost-based markets with generation capacity payments tend to be less volatile than those in markets that are based on price bids and have no generation capacity payment.

⁵⁴ Some of the most developed power markets in the United States, such as PJM, NYISO, and New England Pool have explicit demand response mechanisms, which are useful in increasing demand elasticity, reducing spot prices, mitigating market power, and making the system more reliable.

⁵⁵ Joskow (2000).

fluctuations. Since most retail customers are metered and billed on a monthly or bimonthly basis, it would not accomplish much to tell them what spot prices were over the last month or two. Retail customers hold, therefore, that they should be shielded from spot price fluctuations through price-hedging mechanisms adopted by the disco. Bernard and Roland (2000, p. 162) state: "First, end-users are presumably more exposed to risk than power marketers, since the latter can to some extent diversify risk from non-correlated demands among consumers. Second, frequent price changes lead to substantial transaction and adjustment costs for the consumer, mainly due to the need to get information on price changes and react rapidly to them. Carr (2003, p. 2) observes that "exposing small users to market forces without some protection against volatility and some measures of pricing predictability can trigger political intervention." Littlechild observes that a full pass through of wholesale prices would impose a volatile price profile on retail customers, who would not be allowed to negotiate the best price hedge or contractual arrangements to meet their particular needs.⁵⁶ Littlechild also points to evidence that final customers prefer some form of hedge rather than being fully exposed to spot prices.⁵⁷

- Customers in San Diego, California, fiercely objected to price variations when prices rose unexpectedly. Price increases proved to be politically unsustainable;
- In the United Kingdom, there is full retail competition and marketers are free to offer pool-price terms to their customers. However, when given this choice, just a small percentage of industrial customers and virtually no residential customers are buying at "un-hedged" pool prices;
- Less than 15 percent of customers in Norway have chosen to buy at "un-hedged" pool prices, even though they have this option.

Regulators have several options for dealing with the pass through of spot price volatility to retail customers. The principal options and their implications are discussed below:

(i) *Forced discos hedging without remuneration.*

Distribution companies are forced to buy in the spot market, but are not authorized to pass through their spot market costs and volatility. Instead, they are

forced to sell at fixed tariffs that cap power prices and are adjusted infrequently. Unless there is an explicit compensation for the risks taken by the discos, they may be put in a dangerous position because they may be exposed to high spot prices without the possibility to pass these prices through to their customers. One extreme case was observed in California during the recent energy crisis. The utilities in Northern California were required to make all of their power purchases in the California spot market. They were prohibited from hedging by buying some of their power supplies under forward contracts. They were also prohibited from passing the prices of their spot market purchases onto retail customers because their retail tariffs were capped. When spot market prices skyrocketed because of some combination of a shift in market fundamentals and the exercise of market power, the discos were caught in an impossible squeeze between significantly increased spot market prices and fixed retail tariffs. As a consequence, PG&E, one of the California utilities, filed for bankruptcy.

(ii) *"Socialized hedging."* Discos buy in the spot market at ex ante "smoothed" spot prices, and these prices serve as a basis for cost pass through. Some seasonal spot price variation may be incorporated in the calculated price and passed through to final customers. Differences between estimated (ex ante) and actual (ex post) spot price are absorbed by an "equalization" fund. Neither the discos nor the retail customers are exposed to volatility in the spot market. Under this system there is hedging but it is performed by a government-run fund rather than through the actions of individual discos. This system has been used in Argentina and is described more fully in appendix 1.

(iii) *Power contracts.* This is the most common form of hedge. Discos are allowed, encouraged, or even mandated to sign power contracts with generators or marketers. These contracts, known as forward contracts, provide a hedge against future variations in the spot price. In effect, the discos are hedging on behalf of their retail customers. Ultimately consumers must pay for the cost of hedging. And like any other cost incurred on behalf of captive customers, the regulator must decide whether the disco did an efficient job of hedging.

⁵⁶ Littlechild (2000).

⁵⁷ Littlechild (2003, pp. 68–79).

(iv) *Fixed/variable (known as “Fi/Va”)*. This is a hybrid proposal. It combines the advantages of full pass through of spot prices with the possibility of providing some form of hedge via contracting. Final customers are partially exposed to variations in the spot price because a pre-specified portion of their purchases is tied to spot market prices, while the remaining portion is sold at a fixed price. The disco must hedge on behalf of final customers for the portion of sales that are sold at fixed prices.⁵⁸ Under this design a disco has to procure a certain percentage of its energy in the spot market, and this percentage corresponds to the portion of retail load that will be sold at full spot prices. The regulator must specify a recommended spot/contract mix when defining the benchmark for pass through purposes. A variant of this tariff model was used in Brazil between June 2001 and February 2002 as a technique for dealing with supply shortages.⁵⁹ The Fi/Va model has been recommended as a permanent solution since it has the potential for creating more demand response.

Contract Market Prices

An alternative approach to spot prices is to define the pass through benchmark using prices of energy traded in the contract market. Needless to say, this mechanism assumes the existence of a liquid and competitive contract market to provide a reliable “proxy” or benchmark. Contract market prices are also one element of the Multi-Market Benchmark calculated by the regulator in Colombia (see the next section below). A similar approach has been proposed for Brazil, once a contract market develops sufficiently.

If a fully developed contract market is not yet in place, the benchmark may be based on contract prices resulting from competitive procurements, as previously discussed. Those represent the best available contract

market prices at the early stages of sector reform. Countries in Central America that have adopted this approach have generally established high minimum contracting obligations for the discos, typically that 80–100 percent of the load of their regulated customers being covered by medium- and long-term contracts. The rationale for imposing this obligation is the belief that it will be difficult to get investments in new generation capacity without long-term purchase commitments from the discos. While this provides a more stable pass through mechanism, it does not provide any short-term price signals to consumers.⁶⁰

Multi-Market Benchmark

This approach creates a benchmark based on both actual spot and contract purchases by discos. The benchmark is typically based on the actual power purchases of all discos within a country. Ex post, Multi-Market Benchmarks have been adopted by Colombian and Dutch regulators.⁶¹ In both countries, discos are allowed to automatically pass through a large percentage of their total power purchase costs, but pass through of the remaining share is keyed to a benchmark rather than to the actual purchase costs.⁶² The benchmark is based on average prices paid by all distribution companies or retailers for all purchases (that is, spot, intermediate, and long-term purchases). In Colombia, the pass through mechanism uses a benchmark that takes into account an average of market purchasing prices. Each month the wholesale costs component in tariffs is adjusted using an ex post 12-month moving average. For each disco the moving average is calculated using the actual prices that it paid for its spot and contract purchases. The same calculation is done for the market as a whole (the average price for all discos and retailers that results from their mix of spot and contract purchases).

⁵⁸ Parmesano (2003). The author contends that this mechanism enables regulators to encourage some demand response without the drawbacks of the full-pass through model proposed by Joskow (2000).

⁵⁹ The rationing system put in place had the explicit objective to create price demand response. Large customers were charged the spot price for consumption above their assigned quotas. Residential customers were charged a “proxy” for the spot price. For more details, see Maurer (2003).

⁶⁰ Most benchmarks based on contract prices also allow the pass through of power purchased on a spot basis, to hedge utilities against the risk of errors in the load forecast. However, since the level of contracting is so high, the impact of short-term prices on the final benchmark may be almost negligible.

⁶¹ This model was introduced in the Netherlands in January 2001 and was discontinued in March 2002. A Dutch court found that the mechanism was inconsistent with the Dutch Electricity Act enacted on July 1, 1999.

⁶² The percentage of a disco’s total power purchase costs keyed to a benchmark varies on a country-by-country basis. In Colombia, it is about 10 percent while in the Netherlands it is 50 percent. This implies that in Colombia, 90 percent of the energy costs has automatic pass through and 10 percent depends on the disco’s performance relative to the benchmark. In the Netherlands, only 50 percent of the energy costs has automatic pass through; therefore the Dutch discos are more exposed to the risk of not having their power purchasing costs fully recovered.

Table 3. Pass Through Mechanisms Scorecard

DESIRABLE ATTRIBUTES	Full Pass Through of Power Purchase Costs (A)	Review of Power Contracts (By Regulators)		Administratively Set Benchmarks (PURPA Phase I Avoided Cost) (D)	Mandated Competitive Procurement			Market Benchmarks			
		Ex Ante (B)	Ex Post (C)		Physical Contracts (E)	Financial Contracts (F)	For Default Supplier (G)	Ex Ante Spot Market Prices (H)	Ex Post Spot Market Prices (I)	Contract Prices (J)	Multi-Market Benchmarks (K)
a) Provide incentives for effective energy procurement	1	2	2	3	4	5	5	3	3	4	5
b) Provide incentives for contracting and expansion	4	3	2	4	4	4	3	2	1	3	4
c) Reduce price volatility for customers	3	4	4	4	5	4	4	2	2	4	3
d) Allow discos to fully recover prudent power purchase costs	4	3	2	4	4	4	5	3	3	3	4
e) Provide efficient price signals for customers to react	3	3	3	3	3	4	4	4	4	3	4
f) Reduce chances of price manipulation by government	3	3	1	1	3	4	5	2	3	4	4
g) Reduce self-dealing and collusion impacts	2	3	3	4	3	4	5	2	3	4	4
h) Minimize the number of regulatory actions/decisions	3	3	2	3	3	4	3	3	4	4	4
TOTAL SCORE	23	24	19	26	29	33	34	21	23	29	32

Source: The World Bank

The ex post, Multi-Market Benchmark requires effective spot and active contract markets, with a sufficiently large number of buyers and sellers. Those conditions are initially encountered in many developing and transition-economy countries. As a general rule, a market benchmark is appropriate only when there is reason to believe that no market participant, whether a buyer or seller, is in a position to manipulate the benchmark.

4. RANKING PASS THROUGH METHODOLOGIES

As previously stated in chapter 3, no one methodology is appropriate in all power sector models. The choice of methodology will be influenced by the characteristics of the sector in which the disco is operating. For example, a market benchmark is not feasible in the absence of a functioning market or when sellers are able to manipulate the market.

A key sector characteristic that influences the selection of a pass through methodology is the presence (or absence) of affiliated generators or marketers. Whenever a disco has the right to buy from an affiliated generator or marketer, there is always the possibility that the disco may pay higher prices or assume more risk than it would if it were purchasing from a non-affiliate. Another important consideration is the starting level of retail tariffs. If these do not cover the cost, then it would be dangerous to establish a pass through benchmarks that create an additional risk that some portion of power purchases will not be recovered. Such benchmarks could easily drive the disco into bankruptcy.

As the sector evolves and these characteristics change, it may also be desirable, as discussed in chapter 6, to make changes in the regulatory pass through mechanism.

Table 3 provides our subjective assessment of the pass through methodologies described earlier against the set of desirable attributes spelled out in chapter 2. For any given attribute, “5” is the highest score and “1” is the lowest. The implicit assumption is that the disco is operating in an industry structure that allows the regulator to employ any of the pass through methodologies. However, this is clearly an unrealistic assumption in

some developing and transition-economy countries. For example, as noted above, a market benchmark is not feasible if there is no functioning and observable market. And even if the market is functioning and observable, it still may not provide a good benchmark if it is not competitive. Nevertheless, we still think that it is useful to do a side-by-side assessment as if all pass through methodologies were available. This has the benefit of exposing the strengths and weaknesses of the different methodologies in a direct and transparent way.

Based on their relative attractiveness shown in table 3, methodologies may be grouped into four major clusters, as illustrated in table 4.

A discussion of the ranking clusters shown in table 4 follows.

Table 4. Ranking Pass Through Methodologies

CLUSTER #1 (OVERALL SCORE > 30)	CLUSTER # 2 (25 < OVERALL SCORE < 30)	CLUSTER # 3 (< 20 OVERALL SCORE < 25)	CLUSTER # 4 (OVERALL SCORE < 20)
Mandated Competitive Procurement for Default Supplier	Mandated Competitive Procurement for Physical Contracts	Ex Ante Review of Power Contracts	Ex Post Review of Power Contracts
Mandated Procurement for Financial Contracts	Market Benchmarks – Contract Market Prices	Ex Post Spot Prices	
Multi-Market Benchmarks	Administratively Set Benchmarks	Ex Ante Spot Prices	
		Full Pass Through of Power Purchase Costs	

Source: The World Bank.

Cluster # 1 (Overall score > 30)

Mandated Competitive Bidding for Default Supplier—If the sector structure can support it, the best methodology would possibly be to have generators bidding out a

portfolio of contracts to the discos, which would play the function of a default provider.⁶³ (See column G in table 3). This process has to be conducted by a third, independent party. This was the approach used recently in New Jersey. As discussed earlier, this methodology was introduced in the context of choosing a default provider when there is full retail competition. If adopted, it leads to a significant change in the role of the disco. The disco is no longer an active agent in seeking power supplies for its captive customers. Instead, it assumes the role of a passive procurement agent that is reimbursed for procurement expenses but with no potential for earning profits on its procurement activities. If a government is willing to accept this diminished role for a disco, this approach has several advantages:

- It directly transfers the benefits of wholesale competition to retail customers;
- It does not require second-guessing the actions of distribution companies;
- It avoids discos to stifle retail competition, since the bidding process does not create any economic value for the discos;
- The regulator does not need to specify an optimal pattern of spot and contract purchases; and
- It makes it difficult for the distribution company to show favoritism to affiliated producers.

However, this is a feasible option only if there is a well-functioning spot market and if it operates over a relatively large geographic area so that it is both liquid and competitive. And, if there is congestion on the transmission grid, the congestion should be explicitly priced (as is the case in the Middle Atlantic, where New Jersey is located). Those conditions are unlikely to exist in the near future in most countries in which the World Bank provides financing.

In New Jersey, this methodology was adopted in the context of choosing a default supplier in the presence of full retail competition. But we think that it might be possible to employ a similar approach even in the absence of retail competition as long as the wholesale market prerequisites are satisfied—sufficient competition and technology to support the auction process. In Brazil, there have been some discussions of adopting a variant of the New Jersey approach for auctions of capacity and energy that become available as initial vesting contracts expire.

The New Jersey approach could be enhanced if it were combined with the Fixed-Variable tariff-setting methodology for captive retail customers recommended by Parmesano (2003). The combination of the two approaches would help to minimize overall supply costs while still exposing retail customers to the marginal cost of power for some part of their consumption.

If a government decides that it wants distribution companies to remain as active procurement agents on behalf of their captive or default customers, two other approaches are worth considering: Mandated Competitive Procurement for Financial Contracts (column F in table 3) or Multi-Market Benchmarks (column K). Both of them require a functioning spot market and adequate institutional and regulatory capability. Those conditions may not be present in some World Bank client countries.

Mandated Competitive Procurement for Financial Contracts—This option may be implemented in both large and small systems. Financial contracts are relatively straightforward. They provide a financial hedge against spot price volatility and basically specify energy volumes and prices.⁶⁴ Financial contracts do not have to address a myriad of issues such as plant reliability or penalties in response to the unavailability of generation. In principle, if the seller is not able to supply the energy, it must acquire the shortfall in the spot market, which is the simplest possible form of compensation for “liquidated damages.” Therefore these contracts do not need to include complex clauses and related penalties for unavailability. Such contracts may be awarded solely based on prices, which increase transparency and the regulator’s ability to monitor the process. We recommend these contracts to be implemented after the initial stages of sector reform. It is very important that market participants and regulators develop financial contracts that are simple and easily understood. A simple, cost-based⁶⁵ spot market based on financial contracts is a natural transition from the existing centralized least-cost dispatch pools and represents the best tradeoff between efficiency and implementation complexity.

Multi-Market Benchmarks—These are based on actual purchases of multiple discos in multiple markets (contract and spot markets). The benchmark explicitly

⁶³ Hunt (2002, p. 234).

⁶⁴ Energy volumes and corresponding prices may be profiled over time (day, month, season, year)

⁶⁵ Cost-based markets are simpler because the operation of the spot market is based on the security-constrained, centralized least-cost dispatch criteria that have been used for many years in a large number of World Bank client countries.

recognizes that a disco can and should purchase bulk power under a variety of terms and conditions. It has several advantages:

- The regulator does not need to pre-specify an optimal pattern of spot and contract purchases;⁶⁶
- Since the benchmark is transparent, the regulator does not need to conduct after-the-fact “prudence” reviews of the discos’ purchasing practices;
- The regulator does not need to mandate competitive procurement because the disco will have an incentive to seek out the least-cost supply options, since they may be able to earn profits on their purchases if they “beat” the benchmark;
- It creates an incentive for distributors to engage in hedging or other risk management practices;
- It creates a disincentive for distributors to pay above-market prices to affiliated generators and marketers because such payments create the risk that the discos will not be able to pass through the inflated costs to their captive customers; and
- It is simpler to implement and reduces the impact of self-dealing transactions.

However, Multi-Market Benchmarks do have certain disadvantages. First, a benchmark will not be fair to any company that is always on the “wrong side of the benchmark” for reasons beyond its control. For example, a distribution company may always be above the benchmark if its customer mix is more costly to serve (it may be serving customers that in the aggregate produce a more peaked load curve).⁶⁷ Second, the disco may always have to pay a higher purchase price if it is considered less creditworthy by generators (for example, if it is a distribution company serving an area with a large number of customers in arrears). Third, the benchmark requires a full disclosure of contract information to the regulatory authorities, which may create some discomfort among industry players. Finally, this alternative is feasible only in countries in which there are efficient spot and contract markets and a

sufficient number of discos (at least five or six) to create a benchmark that will not be dominated by the performance of one disco.

Cluster # 2 (25 < Overall Score < 30)

If spot markets are not available or if a procurement price benchmark is infeasible because there are only one or two discos, the next best available options are probably the Mandated Competitive Procurement for Physical Contracts (column E in table 3) or Market Benchmarks based on Contract Prices (column J).

Mandated Procurement Based on Physical Contracts— This approach emphasizes regulating conduct (the procurement process) rather than performance (price benchmark). The option may be effective, but it is usually complex. The Request for Proposals (RFPs) must specify many different attributes such as energy volumes, prices of capacity and energy, point(s) of delivery, reservations on transmission system, penalties for plant unavailability, generation sources, environmental constraints, and other key parameters. This, in turn, requires a more elaborate system of evaluation to find the best outcome after giving explicit weights to the different attributes.⁶⁸ In countries where competition is limited, the design of physical contracts may lead to only one or two bidders. Given the complexity of the physical contracts, if the incumbent disco has the right to build and own generation assets, it will likely “game” the system to favor its own generation.⁶⁹ This has been the ongoing concern in Florida for more than a decade.

Market Benchmarks Based on Contract Prices— This option is a simplified version of Multi-Market Benchmarks, whereby energy purchased on a spot basis (if any) is not taken into account by the regulator when setting a pass through reference price. Only the price of power traded under contracts matter. This alternative shares many of the advantages and disadvantages of Multi-Market Benchmarks, and it is more applicable

⁶⁶ In Colombia, the discos purchase about 70–80 percent of their supply needs through contracts even though there is no formal and legal requirement that they do so. In contrast, the Bolivian discos are required to purchase 100 percent of their supply needs but they have never complied with this obligation. Hunt (2002, p. 50) observes that discos, when given the freedom to make their own procurement decisions, tend to obtain about 80 percent of their supply needs in the contract market and the rest in the spot market.

⁶⁷ Each utility will sign a variety of contracts depending on the load shape and the degree of “firmness” required by its load. An optimized portfolio will include, among other things, seasonal contracts, peaking versus base power, firm versus interruptible, and other arrangements necessary to match supply with actual demand. If a utility’s load shape varies considerably from the average of the market, some adjustment may be necessary to fine-tune the Multi-Market Benchmark.

⁶⁸ For a more elaborate analysis on bid evaluation procedures, please refer to Makler and Schleimer (2003, p. 35).

⁶⁹ This has been one of the reasons why in some countries distribution and generation have been explicitly unbundled and discos are not authorized to own generation assets.

when discos procure a large part of their power needs on a contract basis, or in situations under which discos are not allowed to participate in the spot market at all (for example, in Chile).

Administrative Set Benchmarks—These represent a “proxy” for Contract Prices. Such benchmarks are likely to be used at the early stages of the reform process, when benchmarks from both the freely negotiated contract and spot markets are not available or are not reliable, if most of the power is still traded under vesting contracts, and at subsidized prices. Administrative Set Benchmarks can easily be manipulated for near-term political needs. Those benchmarks may be necessary at the outset of the reform process, but our recommendation is to migrate to Contract Prices or Multi-Market Benchmarks as soon as feasible.

Cluster # 3 (20 < Overall Score < 25)

This cluster includes Spot Market Benchmarks, calculated either on an ex ante (column H in table 3) or ex post basis (Column I). In the absence of spot markets, regulators may rely on Review of Power Contracts performed on an ex ante basis (column B) or Full Pass Through of Contract Costs (column A).

Spot Market Benchmarks—These benchmarks are based exclusively on actual or predicted spot prices and are widely used throughout Latin America. The fundamental problem with a spot market benchmark is that it provides few incentives for long-term contracting—often a prerequisite for the expansion of generation capacity.⁷⁰ If a disco has the right to automatically pass through actual spot prices, it will generally have little or no incentive to enter into long-term contracts. To counterbalance this disincentive to contract, several Latin American countries have added an additional requirement that discos must enter into a long-term contract. So, this is the case where the flaws in one regulatory action (the use of a spot market benchmark) have to be corrected through a secondary regulatory action.

Spot Market Benchmarks are susceptible to manipulation, particularly if the benchmark is based on ex ante calculation by a regulator or the system

operator whose calculation and assumptions can be influenced by government authorities. The behavior and the determination of spot price becomes a matter of great interest to politicians whenever spot prices have a direct impact on tariffs. As spot prices increase, governments may be tempted to promote changes in the rules and methodologies to avoid tariff increases. Moreover, when benchmarks calculated with estimated spot prices are kept artificially low, or generators are fearful of benchmark manipulation, a disco is unlikely to find generators that are willing to contract or build new generation. In some cases, discos have held procurements for new long-term supplies but failed to receive any bids. Spot price benchmarks create risks of high tariff volatility, which may affect the financial viability of a disco, depending on the lag in tariff adjustment.

Review of Power Contracts on an Ex Ante Basis—Under this approach, regulators specify the guidelines and detailed terms and conditions of the power contracts. It is often used in conjunction with Mandated Competitive Procurement. Industry players complain that, by reviewing contracts, the regulator becomes more of a manager than a regulator and that they cannot be held responsible for the outcomes if the regulator is interfering with decisions that should be made by market participants rather than the regulator. This was a complaint in Panama, where the regulator played an active role in specifying the terms and conditions of the contract that discos will be allowed to sign.

Full Pass Through of Power Purchase Costs—This alternative has several drawbacks. It effectively eliminates any incentives for distribution utilities to purchase efficiently—by removing penalties for inefficient purchases. The lack of incentives for effective procurement increases the likelihood of self-dealing and collusion. However, this is a reasonable regulatory approach when the power purchase price is clearly beyond the control of the disco, for example, when a disco has been assigned vesting contracts or is required to purchase power from a single buyer or through competitive procurement.

⁷⁰ That has been the situation observed in Argentina, where pass through of power costs has been based exclusively on spot prices. Discos have pointed out that long-term contracts may attract additional capacity and therefore reduce spot prices. While this benefits consumers, it endangers their ability to pass through the contract costs to the final customers.

Cluster # 4 (Overall score <20)

Ex Post Review of Power Contracts—This methodology ranks last in our evaluation because of the considerable regulatory uncertainties associated with the process, which hinder expansion and effective procurement. It greatly increases risks for investors because the contracts become vulnerable to after-the-fact manipulation and modifications by the regulators, and therefore raises doubts about contract sanctity. Discos have no guarantee that legitimate power purchase costs will be recovered. The overall process is time-consuming and cumbersome.

The after-the-fact review by the regulator becomes especially complex if the disco is allowed to purchase from an affiliated supplier. As seen in the Florida example, it is very difficult for a regulator to detect and prevent subtle forms of favoritism. And even if affiliated purchases are prohibited, there is still the issue of corruption—particularly if the disco is state owned. Because of the complexity and the large amounts of money involved in these procurements, they are prime candidates for bribery and corruption. In some countries, state-owned utilities were forced to enter into overpriced PPAs. Presumably, this will be less of an issue for privately owned discos that are less susceptible to political interference. But there still remains the problem of how to motivate a private disco to purchase efficiently if it is not allowed to make profits on its purchasing activities.

After-the-fact review may be necessary in cases in which there is clear evidence of corruption in the signing of the original contract. If such contracts are allowed to stay in force, they may effectively block further reforms because of their high prices, and the questions that they raise about the integrity of the reform process. If there is an after-the-fact review, we recommend that it be conducted by an independent and non-political group. If it is conducted by a political entity (for example, a legislative committee), it is likely that the process will become highly politicized and produce few, if any, long-run benefits for consumers.

5. CHALLENGES FOR REGULATORS

Regulatory capacity is a must in power sector reform. At the early stages of introduction of competition “for the market,” when private developers are invited to build green-field generation, there is a need for an independent, transparent, and capable regulator, who can understand and monitor procurement costs, system reliability, risk allocation, and their impact on investments and tariffs to final customers.

In trying to develop effective pass through mechanisms, several major unresolved issues remain for regulators. Those issues will be discussed as follows.

Dealing With Affiliate Transactions and Cross-Ownership Issues

Whenever there are transactions between affiliated companies, there is a potential for self-dealing. Affiliated companies may include generators, marketers, or discos that are owned by the same stockholders, have the same board of directors, or are governed by interlocking directorships. In the context of power purchases, self-dealing will hurt the customer if the disco purchases power from an affiliated entity on terms and conditions that are more favorable than those that would be offered to a non-affiliate.

However, self-dealing need not be limited just to price. The disco might, for example, assume more risk (for instance, risk on demand fluctuation) on purchases from an affiliate than from a non-affiliate. Self-dealing could arise even if the contract terms on purchases from affiliates were exactly the same as the terms offered to non-affiliates. Despite the uniformity in contract terms, the disco might enforce a particular provision such as penalties for non-supply more strongly for a nonaffiliated supplier than for an affiliated supplier. Differences in contract enforcement are very subtle and are difficult for a regulator to detect. In the late 1980s, the California electricity regulatory commission prohibited one of the major California utilities from unfairly favoring its generation affiliates when enforcing contract terms and conditions. Similarly, independent power producers in the Southeastern United States that failed to win supply contracts have complained that the Southern Company unfairly favored its affiliated suppliers. It has been difficult to investigate the allegations because the contracts were given

confidential status by the relevant regulatory commission. As a general rule, it is harder to detect such favoritism in physical than in financial contracts, because physical contracts have many more terms and conditions that affect performance and selection. In contrast, the selection decision for financial contracts is usually made on the basis of a single parameter: price.

The most obvious option for regulating self-dealing and cross-ownership issues is to impose an outright prohibition on affiliate transactions. A second option is to establish a maximum percentage of power (for example, 30 percent) that can be purchased from affiliates. These measures try to correct market structure flaws, but are not always effective.⁷¹ A third approach is to mandate a procurement that makes it difficult to favor an affiliate over a nonaffiliated supplier. Usually, this involves requiring discos to acquire a significant part of their energy requirements via a competitive procurement process. This last approach has been used in many countries and at different stages of electric sector reform. If the competitive procurement is going to be successful in preventing affiliate abuse, the procurement rules need to be simple, transparent, and capable of reducing barriers to entry. The design of the auction process itself, both on the buyer's and seller's side, is also critical to mitigate market power.⁷² However, as the Florida experience shows, it is not easy to craft such rules in a world of physical contracts (see box 2).

Obligations Imposed on Distribution Companies to Maintain a Minimum Contracting Requirement

Are mandated contracts a must for power expansion? In many countries long-term contracts have been mandated on the presumption that they are needed to obtain adequate investment in new generation supplies (see table 2). Therefore, many countries have established minimum contracting requirements for discos. It is not uncommon for the minimum contracting

requirements to be written into a country's electricity law. However, real world experience has shown that these requirements are not always enforceable.⁷³ In some countries, discos unable or unwilling to meet the requirements have lobbied to either get full pass through for their purchases on the spot market, or to get last-minute caps on spot prices, therefore limiting discos' exposure.⁷⁴

Colombia provides an interesting counter-example to the conventional wisdom that discos must be mandated to enter into contracts. The country waived minimum contract requirements in 1999, and has observed the emergence of a vibrant contract market. Generation expansion continues to take place, and it has been supported by short- and medium-term contracts.⁷⁵ Like Colombia, El Salvador has no minimum contracting requirements for its discos. Instead, discos are allowed to recover costs of power purchases up to actual spot prices. Under this system, discos there have been contracting about 70–80 percent of their supply needs.

Based on the above examples, it seems that the minimum contracting obligation alone has not achieved its objectives. There should be more important factors that explain differences in contracting attitude among countries.

A reasonable explanation has to do with the existing incentives and penalties for a disco to contract energy in a responsible and profitable way. It is well known that electricity is one of the most volatile commodities. For a distribution company with an implicit obligation to serve, this volatility (and the risks it entails) should be the strongest incentive for it to remain highly contracted, therefore covering a very large part of its supply needs. Contracts should work as a hedge against the potentially catastrophic risk of being "short," particularly in times of power scarcity and high spot prices. The incentives and penalties to encourage responsible and

⁷¹ Outright prohibition may exclude some market participants with genuine economies of scale or scope. Limits on self-dealing are difficult to enforce, particularly during periods of shortage, when the goal of expanding the system overrides any concern for market competitiveness. Furthermore, energy traded within the self-dealing limits has to be reviewed so the potential for abuse is still present though on a smaller scale.

⁷² A lot of experience has been accumulated in the last few years in auction design and implementation in infrastructure industries. A detailed discussion on this subject is beyond the scope of this paper, however.

⁷³ In Bolivia, no contracts have been signed by discos even though the law requires that they must contract for 80 percent of their supply needs. In Chile, at least two discos have held procurements for long-term supplies for which no bidders showed up.

⁷⁴ On the other hand, if a disco is unable to contract and becomes unwillingly exposed to spot purchases for reasons beyond its control, some protection may be necessary to guarantee its feasibility. If no generators are willing to sell energy on a contract basis because of price caps on pass through price, regulatory provisions should be adjusted to allow discos to recover costs of power procured in the spot market. The design of the pass through mechanism has to be consistent with the reality of the power market.

⁷⁵ Colombia challenges the conventional wisdom that 15–20 year PPAs are the only avenue to achieve expansion of the power sector.

profitable contracting seem to be clearly in place, as long as the pass through rules are consistent with this risk.⁷⁶

However, there are countervailing forces that create incentives for a disco to be under-contracted:

- (i) In power sectors where hydro-generation is dominant, there may be several consecutive years of low spot prices, followed by a period of extremely high spot spikes (caused, for example, by a serious drought). This kind of price behavior may create incentives for discos to gamble, by remaining under-contracted most of the time;
- (ii) Quarterly-results-oriented managers making decisions today may benefit from low spot prices in several consecutive seasons or even years if the pass through mechanism allows them to retain part of the profits deriving from low prices paid in the spot market. Purchases in the spot market may end up being the preferred course of action, particularly if there are other pass through risks associated with long-term contracting;⁷⁷
- (iii) Discos may have an expectation of being bailed out by the government if their exposures to high prices reach dangerous levels. When there are scarcity conditions and spot prices skyrocket, it is likely that utilities or discos will ask for government support. Governments in general are reluctant to let private infrastructure providers go bankrupt. There is a perception that essential services may be disrupted. Therefore bankruptcy is not perceived as a credible threat by discos' managers.⁷⁸

These factors, in tandem with poorly designed pass through mechanisms, may seriously weaken the incentives for discos to enter into contracts which in turn may compel a government to impose mandated contracting requirements.

However, expectations of bailout are not the same across utilities in different countries. For example, in Colombia, companies have learned, in the aftermath of El Niño, that the government would not provide a generalized bailout to cover their losses when spot prices

reach very high levels. Some discos indeed suffered the consequences of being “short” in the market. Another example took place in New Zealand, during the 2001 drought, when prices reached US\$ 300/MWh. Transalta, a Canadian subsidiary with operations in that country, was under-contracted and had to buy significant amounts of energy in the spot market at very high prices. The company went bankrupt, and there was no protection or bailout from the government. Transfer of ownership took place in a very smooth way, with no flicker of light or service disruption.⁷⁹ If a disco fully internalizes the consequences of its procurement policies, managers will try to protect the company against market and price risks by adopting a responsible contracting attitude.

Performance-Based Regulation (PBR)— Calibrating Incentives and Penalties

Performance-Based Regulation on Power Costs

Gains and losses deriving from good or bad procurement should be shared among customers and discos' shareholders. By mandating this, regulators create a better alignment between the interests of customers and those of shareholders—which is the underlying motivation for performance-based regulation (PBR). However, there is no single optimal sharing mechanism. The challenge is to create incentives for efficient procurement while recognizing that there are factors beyond a disco's control. A well-designed and calibrated sharing mechanism can help regulators deal with those tradeoffs.

Table 5 provides a simple example of a sharing mechanism. Let us assume that the amount authorized to be passed through is determined by the following formula:

$$\text{Amount Authorized for Pass Through} = \text{Alpha} \times \text{Price Paid for Power} + (1 - \text{Alpha}) \times \text{Benchmark}^{80}$$

Alpha is a number between 0 and 1, which assigns relative weights to the actual *Price Paid by Power* vis-à-vis the

⁷⁶ There are other factors—regulatory and market design decisions—that will affect the behavior of discos and generators. These include generators' receiving a capacity payment, discos' having a legal obligation to enter into long-term contracts for some portion of their retail load, the coverage of the pass through mechanism (price, quantity, or total cost), and the time lag before the pass through actually occurs. On this last element, see box 1.

⁷⁷ If by contracting a disco can make an additional profit, the situation may change. Both in Colombia and El Salvador the disco that contracts at lower prices will profit from the difference. In both of these markets all discos maintain a high percentage of contracts, even if there are no contracting obligations.

⁷⁸ An interesting discussion on governments' reluctance to let private providers go bankrupt can be found on Ehrhardt and Irwin (2003, pp. 26–29).

⁷⁹ Informal conversation with Hon. Max Bradford, former Minister of Energy in New Zealand.

⁸⁰ This is a simplified version of the pass through formula. A more detailed algebraic formulation is shown in appendix 2.

Benchmark established by the Regulator. A high Alpha assigns more weight to the actual price paid. Conversely, a very low Alpha assigns more weight to the Benchmark. The latter entails more risk to the discos. Assuming an Alpha factor of 0.9, and a benchmark of US\$ 33/MWh, the sharing mechanism would work as follows:

- If the disco is efficient and able to procure energy at a lower cost than the Benchmark—for example, US\$ 28/MWh—it would pass through $[0.9 * 28 + 0.1 * 33] = \text{US\$ } 28.5$ to the customers and it would retain a benefit of $[28.5 - 28.0] = \text{US\$ } 0.5/\text{MWh}$;
- Conversely, if the disco pays US\$ 38/MWh, therefore exceeding the benchmark, it would pass through only $[0.9 * 38 + 0.1 * 33] = \text{US\$ } 37.5/\text{MWh}$ to the final customer, and the disco would bear a cost of $[38.0 - 37.5] = \text{US\$ } 0.5/\text{MWh}$.

In this particular example, incentives and penalties are symmetrical, that is, deviations over and below the benchmark have a symmetrical treatment in terms of incentives or penalties.

The overall PBR mechanism provides a good alignment between the interests of the customers and those of the utility shareholder. However, it needs to be “calibrated” to meet the needs of a particular sector. Changes in Alpha will affect the following attributes:⁸¹

- Incentives for effective procurement;
- Incentives for discos to contract and hedge themselves against spot price volatility;
- Possibility of discos’ fully recovering costs of effective power procurement; and
- Incentives (or penalties) for self-dealing transactions.









Table 5. Performance-Based Regulation—A Numerical Example



ENERGY PRICE PAID BY UTILITY (US\$/MWh)	BENCHMARK (US\$/MWh)	ALLOWED PASS THROUGH COST (US\$/MWh)	DISCO BENEFIT OR (PENALTY) (US\$/MWh)
\$28.00	\$33.00	\$28.50	\$0.50
\$30.00	\$33.00	\$30.30	\$0.30
\$32.00	\$33.00	\$32.10	\$0.10
\$33.00	\$33.00	\$33.00	\$0.00
\$34.00	\$33.00	\$33.90	-\$0.10
\$35.00	\$33.00	\$34.80	-\$0.20
\$38.00	\$33.00	\$37.50	-\$0.50

Source: The World Bank.

Table 6 illustrates variations in the Alpha parameter and their impact on each of the relevant attributes and objectives.

Table 6. Design of Performance-Based Regulation & Self-Dealing Issues

	PROVIDE INCENTIVES FOR EFFECTIVE PROCUREMENT	PROVIDE INCENTIVES FOR CONTRACTING AND EXPANSION	ALLOW DISCOS TO FULLY RECOVER PRUDENT PURCHASE COSTS	REDUCE SELF-DEALING AND COLLUSION IMPACT
LOW ALPHA				
HIGH ALPHA				

KEY:  Helps achieve the objective  Does not help achieve the objective

Source: The World Bank.

⁸¹ These are only some of the attributes desirable for a pass through mechanism identified in table 5. Those attributes not affected by Alpha variations have not been included.

A low Alpha provides incentives for effective procurement. However, given the heavier weight assigned to the market benchmark, there is a regulatory risk that part of the costs of power purchases will not be fully recovered by the discos. This tends to discourage discos to enter into long-term contracts. On the other hand, less weight assigned to the disco's purchasing costs in relation to the market benchmark minimizes incentives for self-dealing and collusion.

A high Alpha has the opposite effect. It reduces incentives for effective procurement, since the disco will have most of its power purchase costs automatically passed through.⁸² A high Alpha reduces risk for the discos by providing more certainty that power purchase costs may be recovered. For this reason, a high Alpha increases the incentives for contracting and expansion. Unfortunately, a high Alpha creates more incentives for self-dealing transactions and market abuse.

Partial PBR (Focusing on Some Elements of Power Costs)

Under the PBR approach, it makes sense to give the disco (or any purchasing agent, acting on its behalf) an incentive to control and manage some costs over which it has significant influence. However, in certain circumstances, the purchasing agent has control over only some elements of the power cost structure. The PBR has to be designed to address those control elements in particular. The following example illustrates a case where a company had control over only some elements of power costs. PBR was designed around those elements.

During the early stages of the sector reform, Northern Ireland introduced the concept of a single buyer. This function was carried out by Northern Ireland Electricity's Power Procurement Business, or PPB. As a single buyer, PPB did not bear significant risks, since it had a captive market and costs could be passed through to the final customers. The first price control formula gave PPB, among other things, incentives to manage the price of fuel for generation, a cost item over which PPB had some control and influence.⁸³ The price control included a sharing mechanism, supplemented by a cap and collar which limited the maximum profits (or losses) that PPB could incur.

The "calibration" of the PBR mechanism has evolved over time. After a few years of experience, the regulator decided that the cap and collar mechanisms were too wide and the maximum profit was easily being attained. More recently, with the opening of the domestic power market, PPB is no longer a monopoly seller or monopsony buyer. PPB is now allowed to compete for sales to non-franchised customers, and incentives to the price formula are being adjusted accordingly. It is expected that with the opening of the market, PPB will experience competitive pressure and the new price formula and incentives will need to be reviewed again. Northern Ireland's experience demonstrates the "dynamic" aspects of any regulatory PBR mechanism and how such mechanisms need to be adjusted as the market structure evolves.

6. PASS THROUGH PROCEDURES—A POSSIBLE EVOLUTIONARY PATH

Pass through methodologies for power purchases are not static. They need to be adjusted as power markets and sector structure evolve. This section describes a possible evolution in pass through approach(es) as the sector becomes more competitive. The sequence of industry and market structure shown in table 7 is not meant to be a rigid, prescriptive evolutionary path for the power sector of every single country, but instead is intended to illustrate some of the best pass through methodologies that may be available to regulators as the power sector evolves. For example, it may not be feasible for a small country that is not connected to a larger power system to have a competitive pool because the country's size precludes the likelihood of workable competition.

The main phases of the proposed evolution are discussed next.

No Competition—When competition does not exist and power markets are not feasible, the regulatory options include an ex ante Review of the Power Contracts and a full pass through of power costs. For integrated discos, the costs of self-generation and power purchases should be subject to a possible "prudence" review. This was the mode of regulation for vertically integrated utilities in the United States. "Prudence" reviews were not automatic. However, it was the possibility of a "prudence" review that kept utilities "on their toes."

⁸² If Alpha = 1, the mechanism would be equivalent to a full pass through.

⁸³ Northern Ireland Electricity's Power Procurement Business (2002, p. 4).

Table 7. Sector Evolution and Pass Through Issues

PASS THROUGH METHODOLOGY	Sector Evolution					
	No competition	Limited competition "for the market"	Some wholesale competition "in the market"	Full wholesale competition	Some retail competition	Full retail competition
* Full Pass Through of Power Purchase Costs [A]	More desirable	Less desirable	Less desirable	Least desirable	Least desirable	Least desirable
* Review of Power Contracts - Ex Ante [B] - Ex Post [C]	More desirable	Least desirable	Least desirable	Least desirable	Least desirable	Least desirable
* Administratively Set Benchmarks (D)	Least desirable	Less desirable	Less desirable	Least desirable	Least desirable	Least desirable
* Mandated Competitive Procurement - Physical Contracts [E] - Financial Contracts [F] - Default Supplier [G]	Least desirable	More desirable	Least desirable	Least desirable	Least desirable	Less desirable
* Market Benchmarks - Ex Ante Spot Market Prices [H] - Ex Post Spot Market Prices (I) - Contract Market Prices (J) - Multi-Market Benchmarks (K)	Least desirable	Least desirable	Less desirable	More desirable	Least desirable	Least desirable

More desirable
 Less desirable
 Least desirable

Source: The World Bank.

Limited Competition "For the Market"—This is the situation when there is a dominant supplier, but some form of competition in generation has been gradually introduced. It is the phase when governments are willing to allow private independent generators to meet future expansion needs. At this stage an integrated utility or single buyer will ideally look at alternative proposals from different IPPs. The preferred regulatory alternative is to mandate the disco (or a buyer acting on its behalf) to conduct a competitive procurement for new power supplies, either with physical or financial contracts.

The selection between those two types of contracts will depend on how the power market is designed. Our recommendation is to organize markets around "financial contracts," if feasible, because of their simplicity and because they pave the road for a seamless evolution of the power market. To ensure maximum efficiency and transparency, the Terms of Reference for the procurement of power should specify "blocks" of energy and associated capacity as opposed to specific, earmarked projects. By doing that, the regulator will enable the market to select the least-

cost, most creative options, as opposed to having the government earmark a power plant that may not necessarily represent the best alternative to end consumers. This simple procedure helps to mitigate some of the corruption that is sometimes associated with procurement by single buyers in countries with central, deterministic planning.⁸⁴ If competitive procurement is not feasible,⁸⁵ a second-best option is to use Administrative Set Benchmarks combined with some form of PBR. Vesting contracts may still exist, and should be granted full pass through. At this phase, the regulator will usually establish minimum contracting requirements on the discos.

Some Wholesale Competition “In the Market”— At this phase, we assume that there is some competition at the wholesale level and that the market is basically organized around financial arrangements. Discos may buy in a contract market, a spot market, or a combination of the two. There is still a need to review the disco’s purchases, since its retail customers have no opportunity to buy from alternative suppliers. The regulator must protect the disco’s captive customers while avoiding the creation of disincentives for investment in new generation supplies. The recommended alternatives include Mandated Competitive Procurement, Multi-Market Benchmarks, or a combination of both. The use of Multi-Market Benchmarks depends on the existence of good “proxies” for power prices at the wholesale level. In less mature markets, it is reasonable to start with Mandated Competitive Procurement and gradually evolve toward Multi-Market Benchmarks. Reference prices from the competitive procurement will help improve the quality of the benchmark, as more purchases are made on a competitive basis. Some form of full pass through of power costs will be necessary if vesting contracts are still operative.

Full Wholesale Competition—This phase is a natural evolution of the previous one, where all energy at wholesale level is traded on a competitive, freely negotiated basis. It implies the existence of efficient and liquid power markets. The regulator may adopt Mandatory Competitive Procurement for financial contracts, Multi-Market Benchmarks, or a combination of both. If a regulator gives discos the freedom to conduct their competitive procurement for power and select their suppliers, the disco’s overall procurement performance should be judged against Multi-Market

Benchmarks. In other words, the fact that a market is competitive on the supply side provides no guarantee that a disco will take advantage of this competition and reduce tariffs to its customers. Conversely, if the procurement process and the power contracts are defined and controlled by the regulator, power purchase costs should be granted full pass through.

Some Retail Competition—Once the sector introduces retail competition, some customers are eligible to look for alternative suppliers.⁸⁶ Initially only large customers are typically given this option and most customers remain captive to the disco. It may also be the case that many free customers prefer to continue to be served by the local utility. The disco will have the continued obligation to serve its captive customers, at regulated tariffs, as well as free customers, possibly at freely negotiated tariffs. Under this scenario, the utility will have an incentive to recover expensive power purchase contracts from captive customers and use cheaper power contracts to retain and possibly attract new customers. From a regulatory standpoint, there are two challenges to be addressed.

- First, the regulator must try to ensure that there are no cross-subsidies among those two customer groups. This can be accomplished either by requiring the disco to create a separate subsidiary to sell to non-captive customers, or by specifying accounting rules on power purchase cost allocation among the free and captive customer groups;
- Second, the regulator must decide on the best pass through methodology.

Assuming that the captive and the free customer groups continue to be served by a disco as one single entity, the best available options will probably be Mandatory Competitive Procurement for financial contracts, Multi-Market Benchmarks, or a combination of both.

Full Retail Competition— This represents the final stage of development in both wholesale and retail markets. At this stage, all customers are eligible to choose alternative suppliers. This would seem to imply that regulation of power purchases is no longer necessary because the distribution company’s retail customers are no longer captive. But even though retail customers may have the legal right to choose, some may never exercise this option and others may never receive competing offers

⁸⁴ Lovei (2000).

⁸⁵ Because of the small size of the market, lumpiness of the investment, or the absence of alternative suppliers.

⁸⁶ In Latin America these customers are often referred to as free customers.

from other marketers. Therefore the incumbent may still be required to serve those customers and some form of pass through regulation will still be necessary. In this situation, our recommendation is to require Mandated Competitive Procurement for the discos as default suppliers. Specific rules for competitive procurement as a default supplier should be defined by the regulator. The model currently used in New Jersey, where the discos are required to obtain default supplies through an auction, and the auction is performed by a third party, represents an industry best practice to be considered by other countries.

However, it is important to keep in mind that the success of this approach derives from the efficiency of its wholesale market.⁸⁷ Many World Bank client countries are either too small or do not have an efficient wholesale market that would support this type of auction.

7. CONCLUDING REMARKS

Selecting a pass through methodology for the costs of power acquired by discos is a challenge faced by regulators worldwide. There is no single, “one-size-fits-all” pass through approach that is appropriate for all countries. Methodologies have to be selected and “fine-tuned” to the specifics of each country or region. The selection will depend critically on the stage of development of the power sector and on existing market institutions.

Any pass through methodologies must satisfy multiple and often conflicting objectives. These objectives include providing incentives for efficient procurement, fostering power sector expansion, and reducing market volatility, while still conveying price signals for at least some consumers to respond. And ultimately, whatever methodology is selected must be capable of being implemented by the regulator.

Market-based pass through mechanisms are generally preferable. These involve mandated competitive procurement for power acquired by discos, or establishing one or more market “benchmarks” against which the “prudence” of the disco’s actual power purchase costs are evaluated.

Mandated Competitive Procurement seems to be the most sensible alternative for captive customers or small customers that are not able or willing to change suppliers. Under those conditions, it should be applicable to all of the energy requirements of a distribution company.⁸⁸ Well-drafted regulations need to be put in place, to achieve transparency and a level playing field in the procurement process, without creating unnecessary barriers to entry for new players. The nature of the pass through mechanism will vary depending on whether the distribution company plays an active role in designing and implementing the procurement. Mandated Competitive Procurement may be used at different stages of market development and industry structure. It should preferably be used with financial contracts, where a spot market does exist.

Determining power cost benchmarks represents another option that becomes feasible once efficient wholesale markets start to emerge. Those benchmarks should be established based on power prices observed both in the contract and spot markets. Benchmarks based just on projected spot market prices, the norm in several Latin American countries, seem to create a number of unintended consequences. A composite benchmark based on spot plus contract market prices requires a more developed market system. It is not an option for small countries or countries without organized wholesale markets. Finally, market benchmarks may do more harm than good if one or more sellers in the market are able to exercise market power.

Other methodologies include full pass through of power purchase costs, Administratively Set Benchmarks, and regulatory review of contracts. They usually fall short of achieving the desired goals for a pass through mechanism, and their use should be minimized.

As the power sector evolves, so should the regulatory approaches for pass through. There needs to be an ongoing consistency between the design of the wholesale market and the pass through mechanism to maximize the potential synergies between retail and wholesale markets.

⁸⁷ Consisting of part of the PJM power pool.

⁸⁸ With the exception of small volumes of energy traded in a balancing market.

APPENDIX 1

Electricity Tariff Equalization Fund in Argentina

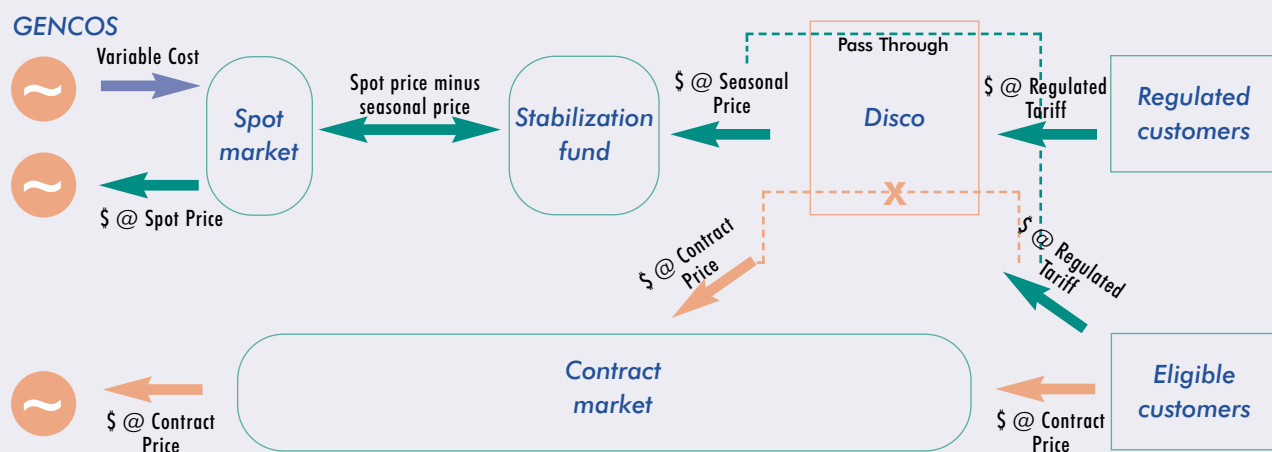
In Argentina, most discos do not rely on forward energy contracts to hedge spot price volatility because they do not face this risk. The Electricity Law has protected discos from volatility risks by allowing them to buy energy on a spot basis at a “smoothed” (or stabilized) price that is approved quarterly, based on regulated procedures and calculations carried out by the System and Market Operator. This “smoothed” price (called seasonal price) is fully transferred to retail tariffs. The seasonal price is a three-month average of the expected future spot price plus adjustments to reflect differences between ex ante seasonal prices and actual spot prices during the previous three-month period.

In addition, a special fund exists to absorb differences between the money paid to all those selling at the actual spot price and the proceeds collected from discos when buying in the spot market. It works in the same manner as a tracking account. The financial costs (or revenues) of the fund are included in the seasonal price calculations. These seasonal prices resemble a “financial contract” between the discos and the fund. Discos pay the seasonal price and the fund pays spot prices to generators. The cost of this hedge is paid by all end consumers that buy from discos, since the cost of hedging is incorporated as an integral part of the Fund and therefore a component of the seasonal prices. Figure 2 illustrates, in a simplified way, how the Stabilization Fund works.

This mechanism is analogous to a mandatory insurance policy. If there is insufficient money in the fund, the government may have to cover the shortfall though additional government payments. If the shortfalls occur on a regular basis, this is an indication that the ex ante spot price is being systematically underestimated, either for technical or political reasons.

Market rules define the methodology for the System and Market Operator to calculate average expected energy prices for the next three months, adjusted to take into consideration any surplus or shortfalls in the Fund. In the early years problems arose because the market rules established that the Fund surplus or shortfall at the end of a trimester had to be fully recovered the following trimester, which implied in some cases major adjustments to tariffs, which in their turn increased volatility and distorted the economic signals to end consumers. For example, a colder-than-expected winter would lead to a fund shortfall and higher reference spot prices transferred to tariffs in the following spring, which was not consistent with the likely abundance of hydroelectric generation offered during the spring months. New market rules had to be put in place to administer the fund in a more stable and efficient manner to avoid this problem. According to the new rules, the System and Market Operator must analyze different scenarios and the minimum amount of money in the Fund to cover deviations between expected and actual conditions.

FIGURE 2. The Stabilization Fund in Argentina



Source: Mercados Energéticos, Buenos Aires, Argentina.

Every three months, the System and Market Operator submits to the government (Energy Secretariat) a seasonal-price report with the relevant calculation, after review and comments from market participants. The government has the right to change the price, but since the report is public, it is impossible to conceal the manipulation of the seasonal price.

The System and Market Operator's report on seasonal prices includes the following elements:

- a) Average spot prices expected for the next three months under different possible future conditions (scenarios), and the probability of occurrence of each;
- b) The difference between the balance in the fund at the end of the trimester and the minimum requirement of the Fund for the next three months to offset possible deviations. The risk of a shortfall or a surplus in the fund is assessed.

Over a sufficiently long period, and in the absence of political interference, the average seasonal prices should be similar to the average energy spot prices, and bulk tariffs paid by discos should be sufficient to pay generators and to cover the working capital needs of the Fund.

The system has advantages and disadvantages. On the one hand, it has provided a price hedge to discos.⁸⁹ The existence of seasonal prices also contributes, at least in theory, to a better linkage between the wholesale price and retail tariffs, possibly inviting some demand response.

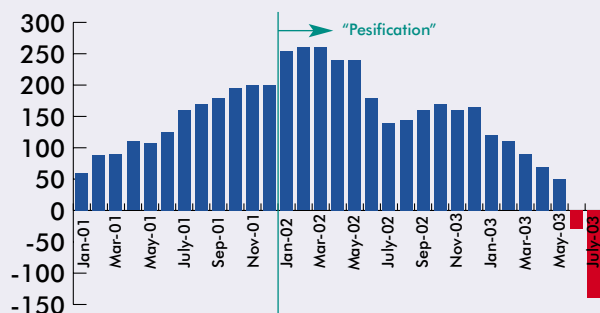
However, because of its seasonal component, some complain that there is still too much volatility built into the price. On the other hand, generators complain that the mechanism is too risky for them because they are unable to contract with discos or are forced to enter into contracts with prices indexed to seasonal prices.

The pass through regulation creates incentives for discos not to contract, since purchases in the spot market

are guaranteed full pass through.⁹⁰ Therefore, this hedging mechanism seems to be an impediment to the development of an active and liquid contract market.⁹¹ There have been several attempts to modify the pass through mechanism and there is a general perception that some pass through of contract prices should be allowed.

Another drawback is that the mechanism may create incentives to manipulate (reduce) actual spot prices.⁹² This happened in the recent macroeconomic crisis in Argentina. In an attempt to maintain stable tariffs (in other words, have no tariff increase), seasonal prices have been maintained constant, in some cases underestimating expected (ex ante) spot prices. Also, market rules have been changed to reduce spot prices that are used to calculate seasonal pass through prices. The Stabilization Fund has been used to compensate the difference between revenues collected from discos and payments made to generators selling in the spot market. As a consequence, the Stabilization Fund has been depleted as illustrated in figure 3. Despite its merits in terms of design and initial implementation, the mechanism has reached a point where it is not sustainable—unless tariffs are adjusted. According to the Market Rules, any deficit in the Fund should be balanced by the government.

FIGURE 3. The Stabilization Fund in Argentina



Source: Mercados Energéticos. Buenos Aires, Argentina.

⁸⁹ El Salvador has introduced a similar fund, to protect discos from the regulatory lag impact created by differences between ex ante and ex post spot prices, particularly in times of high spot price volatility.

⁹⁰ Some contracts were allowed full or partial pass through in Argentina; vesting contracts were allowed full pass through. In a few provinces, the pass through mechanism is slightly different and discos may use a benchmark that includes both the seasonal price and contract prices.

⁹¹ In the particular case of Argentina, the lack of contracts did not hinder expansion initially, for two major reasons: (i) there is a capacity payment to efficient generators that make their capacity available for the provision of ancillary services; and (ii) there has been a relatively active “merchant” generation in Argentina developed under the expectation of exporting energy to Brazil. Nevertheless, in the last few years, no generation has been added to the system. This may be due to the existing level of surplus reserve and the lower expectation of sales to Brazil.

⁹² There have been accusations that the System and Market Operator has tried to reduce actual spot prices by manipulating market rules—for example, by forcing out of merit plants to run, therefore increasing reserves and reducing spot prices. According to the market rules, this type of generation should not set spot prices. The government has a tendency to back up changes that reduce spot prices and limit tariff impact on end customers.

APPENDIX 2

Allowed Power Cost Pass Through to Be Transferred to Regulated Tariffs:
Algebraic Formula Currently Used in Colombia

$$G_{m,t} = \left[\alpha_{m,t} P_m + (1 - \alpha_{m,t}) M_m \right]$$

Where:

- $G_{m,t}$ = Maximum allowed power cost pass through to be transferred to regulated tariffs to final customers
- P_m = Average purchasing cost of the disco for the last 12 months. Prices are indexed to Colombia's index of purchasing power [IPP].

$$P_m = \frac{\sum_{i=1}^{12} \left(P_{m-i} \frac{IPP_{m-1}}{IPP_{m-i}} \right)}{12}$$

- M_m : Market average purchasing cost for the last 12 months. Prices are indexed to Colombia's IPP.

$$M_m = \frac{\sum_{i=1}^{12} \left(M_{m-i} \frac{IPP_{m-1}}{IPP_{m-i}} \right)}{12}$$

- α = Benchmark factor, used to weigh the purchasing cost of the disco in relation to the average cost of power purchased on the market.

REFERENCES

- ANEEL. 2003. "Technical Note No. 23/2003." SEM-ANEEL, Brazil, April 3, 2003.
- Bakovic, Tonci, Bernard Tenenbaum, and Fiona Woolf. 2003. "Regulation by Contract: A New Way to Privatize Electricity Distribution?" World Bank Energy and Mining Sector Board Discussion Paper Series, No.7, March. Available at: www.worldbank.org/energy/subenergy/sectorboard_papers.html
- Bernard, Jean-Thomas, and Michel Roland. 2000. "Load Management Programs, Cross-Subsidies and Transaction Costs: The Case of Self-Rationing." *Resource and Energy Economics*, vol. 22, pp. 161–88.
- Besant-Jones, John, and Bernard Tenenbaum. 2001. "The California Power Crisis: Lessons for Developing Countries." World Bank Energy and Mining Sector Board Discussion Paper Series, No 1. The World Bank Group and ESMAP, April.
- Blumstein, Carl. 1999. "Pricing Electricity for Default Customers: Pass Through or Performance-Based Rates?" Program on Workable Energy Regulation (POWER), University of California at Berkeley, August.
- Carr, Jan. 2003. "Default Supply to Protect Customers and Enhance Wholesale Market Operations." Presentation to Alberta Power Summit (excerpt), Calgary, Alberta, Canada. February 27–28.
- Ehrhardt, D., and T. Irwin. Forthcoming in 2003. *Reducing the Risk of Contract Renegotiation and Taxpayer Bailouts in Private Infrastructure Projects. Policy Toward Leverage, Risk Allocation, and Bankruptcy*. Washington, D.C.: The World Bank Group.
- Hunt, Sally. 2002. *Making Competition Work in Electricity*. New York: Wiley.
- Joskow, Paul. 2000. "Why Do We Need Electricity Retailers? Or Can We Get It Cheaper Wholesale?" Revised discussion draft, Center for Energy and Environmental Policy Research, Massachusetts Institute of Technology, Cambridge, Mass. January 13.
- Littlechild, Stephen. 2000. "Why We Need Electricity Retailers: A Reply to Joskow on Wholesale Spot Price Pass Through." Research Papers in Management Studies, Working Paper 21/2000, University of Cambridge, U.K.
- _____. 2003. "Wholesale Spot Price Pass Through." *Journal of Regulatory Economics* 23(1): 61–91.
- Lovei, Laszlo. 2000. *The Single Buyer Model, Viewpoint 255*, Washington, D.C.: The World Bank.
- Makler, Alexandre, and Steven S. Schleimer. 2003. "Preserving the Benefits of Competition Through Effective Procurement Bidding Rules for Utility Resource Procurement." *Electricity Journal* (July): 27–36.
- Maurer, Luiz. 2003. "Implementing Energy Rationing in a Sensible Way—The Brazilian Case." Presentation, The World Bank, Washington, D.C., January.
- Maurer, Luiz, and Beatriz Arizu, with assistance from Bernard Tenenbaum and Pradip Chattopadhyay. 2002. "Pass Through Mechanisms and VN—A Report for the Ministry of Mines and Energy, Brazil." Public Private Infrastructure Advisory Facility (PPIAF) and The World Bank, September.
- Northern Ireland Electricity's Power Procurement Business, The Director General of Electricity Supply. 2002. "Price Control for the period April 2002–March 2005." Final Proposals Paper, July.
- Parikh, Kirit. 2001. "Thinking Through the Enron Issue." *Economical and Political Weekly* XXXVI(17): 1463–72.
- Parmesano, Hethie. 2003. "Making Every Electricity Consumer a Market Participant (Putting Demand Back in the Equation)." *The Electricity Journal* 16(3): 72–78.
- Plummer, James, and Susan Troppman, eds. 1990. "Competition in Electricity: New Markets and New Structures." Public Utilities Reports, Inc., Arlington, Va., and QED Research Inc., Palo Alto, Calif.
- Stoft, Steven. 2002. *Power System Economics—Designing Markets for Electricity*. IEEE Press. Piscataway, NJ.



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