NRRI 01-08

# USE OF HEDGING BY LOCAL GAS DISTRIBUTION COMPANIES: BASIC CONSIDERATIONS AND REGULATORY ISSUES

Kenneth W. Costello
Senior Institute Economist

and

John Cita, Ph.D
Chief, Economic Policy and Planning
Kansas State Corporation Commission

*The National Regulatory Research Institute*
at The Ohio State University
1080 Carmack Road
Columbus, Ohio 43210-1002
Phone: 614/292-9404
Fax: 614/292-7196
www.nrri.ohio-state.edu

May 2001

---

This report was prepared by The National Regulatory Research Institute (NRRI) with funding provided by participating member commissions of the National Association of Regulatory Utility Commissioners (NARUC). The views and opinions of the authors do not necessarily express or reflect the views, opinions, or policies of the NRRI, the Kansas State Corporation Commission, NARUC, or NARUC member commissions.

# EXECUTIVE SUMMARY

An unexpected price spike of staggering proportions pushed the average price of natural gas for the winter of 2000-2001 to a new plateau, more than double the average price of the previous winter. Largely because of low storage levels and extreme weather conditions, spot gas prices rose to the $9-10 per MMBtu range in December and January. Needless to say, the volatile nature of natural gas prices has had a discomforting effect on consumers and utilities alike.

State public utility commissions (PUCs) and other public officials are concerned that high gas prices can cause financial hardship for retail customers, especially low-income households. In the vast majority of cases, high gas prices get passed along to consumers. Depending upon the jurisdiction, cost recovery by utilities in many states occurs within a few months. As an aggravation, gas-price volatility can make it difficult for residential consumers to accurately plan their budgeting of gas costs. Aggravated further by the uncertainty of weather, the budgeting problem becomes even more severe. While price spikes combined with abnormally cold weather imply that some consumers will be faced with unaffordable bills, more generally it means consumers will face bills they simply did not plan for.

As part of gas contracting responsibilities, utilities are not only concerned with procuring physical gas supplies to meet their required obligation to serve, but they are also concerned about pricing terms. Of course, the price level matters, but so do provisions that specify whether the price is fixed or variable over time. Clearly, depending on whether the utility enters, say, an annual contract that provides for a fixed price or a price that varies with a specific monthly index, consumers will be exposed to different price paths. Buying exclusively gas at index, for example, a gas utility would expose its customers to a "roller coaster" of prices over different time periods.

As an alternative to entering fixed-price gas contracts, the utility can conduct its gas purchasing business on an "at index basis" and then use risk-management tools to smooth out the market-price path.[1] In fact, by using financial derivatives the utility can manage or tailor its price risk by various degrees, ranging from nearly complete elimination of all market volatility to an elimination of just the most extreme price spikes. When it comes to risk management through the use of financial derivatives, the utility has an infinite number of available alternatives to consider. Risk-management alternatives can be evaluated in terms of the degree of volatility removed, cost, and susceptibility to regulatory scrutiny. Some risk-management strategies, such as options, can be relatively costly, requiring an up-front payment that is analogous to an insurance premium.[2] Just as homeowners buy fire insurance to avoid large losses of wealth in the event of a fire, risk-averse consumers may be willing to pay a premium to avoid paying highly variable gas prices. Of course, some

---

[1] Because financial derivatives, such as gas futures contracts, are highly standardized, they tend to be much more liquid and, therefore, more easily traded than forward, fixed-price gas contracts. Since they are more liquid, derivatives generally have lower transaction costs.

[2] Because liquidity is greater in the derivatives market, "premiums" tend to be lower on futures contracts relative to forward contracts. Thus, compared to fixed-price forward contracts, since derivatives tend to have both lower transaction costs and premiums, they generally provide a lower-cost alternative to hedge against price risk.

consumers may not be willing to pay anything extra for increased price stability. It is difficult to know what the average utility customer is willing and able to pay for a particular risk-management strategy. Lastly, utilities that use risk management to lock in a gas price may be criticized by customers if the locked-in price turns out to be greater than the actual market price.

The recent interest in financial derivatives as a risk-management tool gives some urgency to an analysis that touches on at least the basics of price hedging by local gas distribution companies (LDCs). The authors of this report hope to serve that function, as well as identifying the major regulatory issues associated with the use of financial derivatives by LDCs. The report provides a detailed illustration of the use of futures contracts and options, for hedging purposes, by a gas utility.

State PUCs face several issues when it comes to a gas utility hedging with financial derivatives: (1) how hedging fits in with a utility's more traditional gas-management strategy, which involves the purchase of both physical gas and storage, with the latter functioning as a risk-management tool affecting both price and operating risks, (2) establishing the prudently sized budget for risk-management programs, (3) identifying, among the infinite number of alternatives, a specific risk-management strategy or set of strategies that is reasonable for a particular LDC, (4) establishing regulatory incentives for utility hedging and recovery provisions pertaining to hedging-program costs, (5) specifying the operating features of a hedging program, which can include specific safeguards or limits and reporting requirements, (6) evaluating the effectiveness of different hedging tools, and (7) developing "prudence" standards by which to evaluate a utility's hedging practices. In past proceedings, a number of PUCs have articulated positions and opinions on hedging and price volatility and, therefore, have at least touch upon several of these and other issues. Some of those positions and opinions are summarized in this report.

As with virtually everything else in life, financial derivatives can be a two-edged sword: they represent a low-cost, efficient mechanism for transferring risk; on the other hand, they are not costless and they impose their own risk on transactors including hedgers. Financial derivatives have, however, definite advantages over forward, fixed-price gas contracts. Most important, they are more liquid and have lower transaction costs. This report makes several observations about the use of financial derivatives for hedging by LDCs. One is that it is not clear-cut that gas utilities should hedge; whether they should importantly depends on the preferences of customers for price stability and the utility's ability to maintain adequate internal cash funds, given gas-price volatility and the time lag between gas costs being incurred and ultimately recovered. Hedging is more justified when consumers exhibit risk-averse behavior expressed in their willingness to pay for stable prices. A second observation is that LDCs should refrain from speculating. Speculation is an activity where the utility takes on more risk with the expectation of earning a profit. While we suggest that LDCs should refrain from speculating, it is generally recognized that the line between hedging and speculating can be quite thin. Hence, for regulators that find hedging in the public interest, they face the challenge of "brightening" the line between hedging and speculating. Another observation is that hedging with financial derivatives may result in the gas utility locking in a price that turns out to be higher than the prevailing market price. Hedging also should not be expected to reduce the average price of gas purchases over time. Hedging, in its purest form, does not provide a means to reduce the expected price of gas for a utility. Rather, from the consumers' perspective its primary function is to stabilize prices. Generally, risk-averse consumers should be expected to pay extra for shouldering less risk, such as exposure to volatile prices. Finally, traditional purchased gas adjustments mechanisms (PGAs) greatly restrict the incentives of a gas utility to hedge. Either eliminating the PGA or modifying it to shift some of the price risk to a utility's shareholders should motivate the utility to engage in more hedging.[3]

[3] We are not advocating here that regulators eliminate or modify existing PGAs. Existing PGAs may have benefits that override the cost of under-hedging.

# TABLE OF CONTENTS

## TABLE OF CONTENTS—*continued*

# FOREWORD

Rising and volatile natural gas prices over the last several months have stimulated much interest in hedging activities by local gas distribution companies (LDCs). Many state public utility commissions are now asking whether LDCs should become more active in using financial derivatives for hedging purposes. This report examines the basic issues associated with hedging, including regulatory questions that need to be addressed. The report should assist those state commissions considering either requiring or encouraging LDCs to hedge, especially for the next winter heating season.

Raymond W. Lawton, Ph.D
May 2001

## ACKNOWLEDGMENTS

The authors would like to express their gratitude to Mr. Ray Blatter, Dr. Vivian Witkind Davis, Mr. Robert Harding, Mr. Wayne Olson, and Dr. Timothy Sullivan for their review of an earlier draft of this report. Errors that may remain are, of course, the responsibility of the authors.

# INTRODUCTION

Certainly the winter of 2000-2001 was the winter of discontent for consumers of natural gas. During that winter, the convergence of several distinct, yet related, forces resulted in a record-setting gas price riding atop a record spike. The nominal price of gas has been trending up since 1985. But the price trend appears to have shifted upward during the spring of 2000, leaving 2 and 3 dollar gas prices behind in its wake. This shift suggests the possibility of structural change in the gas market or, perhaps, simply the time lag between developing new supply sources and the growth of new demand. Not only is the price of gas trending up, but so is gas-price volatility. In fact, since the mid-1980s, the growth of price volatility in the gas market has exceeded the growth rate of the price level. Specifically, after January 1985, the average gas price in the North American market has increased 2.5 percent per annum, while price volatility has increased 2.8 per cent per annum.[1] While there simply is not much LDCs can do to avoid increases in the average price of gas, the increased price volatility implies an increased probability of price spikes. With the apparent sensitivity of the gas price to changing market conditions, the perception that gas-price uncertainty has increased in

[1] These figures are taken from an article written by Dr. Benjamin Schlesinger of BSA, Inc., appearing in the Fall 2000, *Energy in the New*, published by the NYMEX. Price volatility was measured as the average standard deviation divided by the average mean taken each month over the previous 12-month period.

recent months and that price spikes are more likely in the future seems well-justified.

Given the public outcry resulting from last winter's unexpectedly large gas bills, caused in part by the record price spike, the relevancy of asking about what can be done to possibly avoid a repeat is self-evident. The general answer is also self-evident: the implementation of risk-management programs offers an opportunity, but not a guarantee, that gas consumers can be protected against unexpected price spikes. Risk-management programs can also incorporate protection against abnormal weather, thus providing consumers with the potential of being protected against a colder than normal winter. Risk-management programs that protect against price spikes and, possibly, abnormal cold is one means of protecting against unexpected, record winter gas bills.

Looking forward, do current indications support the consideration of risk-management program for implementation? As noted, gas-price volatility has increased over recent years and may remain on its current upward trend.[2] Moreover, the price of gas continues on its upward trend.[3] Concerns about increasing weather volatility also exist.[4] From our

---

[2] As of the week ending April 20, 2001, the volatility of the spot-month futures price over the previous 5 days was 37.61 percent, and over the previous 20 days it was 46.90 percent. The historical average, using data back to 1986, is less than 20 percent.

[3] Gas futures prices currently show higher prices, on average, over the next three years compared to the last three. One interpretation of that is that today's gas market participants expect increased prices compared to historical levels.

[4] There is ongoing debate about the correlation between possible global warming and increasing weather volatility. There is little doubt about the

(continued...)

perspective, current conditions suggest a repeat of last winter's gas-bill woes is not beyond the whelm of possibility.

Traditionally, LDCs have used fixed-price, forward gas contracts and storage gas to guard against price spikes and weather risk. Both may be referred to as traditional risk-management tools.

Though the traditional tools remain useful, our focus in this report is on LDC risk-management programs that would rely on the more modern risk-management tools. Accordingly, we discuss risk-managements programs that utilize financial derivatives to manage risk. More specifically, we describe the LDC use of financial derivatives as a means to hedge or protect against certain risks faced by their customers or shareholders, depending on the LDC's reliance on pass-through provisions. In this report we describe how futures, options and swaps can be used to hedge against gas-price volatility, though our primary focus is on futures and options.[5] We also discuss how futures and options may be used by the LDC to possibly guard against both price volatility and the LDC's expectation that prices may increase (relative to the existing market forecast). This is in recognition that modern day hedgers may, in practice, be concerned with both price volatility (i.e., spikes) and increases in the price (strip).[6]

---

[4](...continued) correlation between weather and gas price volatility.

[5] We recognize that an optimal risk-management program will likely integrate the use of both traditional and modern risk-management tools. Except for passing references, we leave this integration issue for another day.

[6] Since consumers prefer lower prices and may not be strongly risk averse, as part of its hedging decision the LDC may prefer to avoid the risk that (continued...)

This report provides some hypothetical examples of LDC hedging through the use of gas futures, as well as some hypothetical examples of LDC hedging with options. A comparison of those two approaches is provided. This report will also illustrate that hedging with futures and options generally poses its own risks—hedging is not a costless nor risk-free activity. Certainly, if hedging programs are carried out by regulated entities, hedging may invoke a regulatory risk in addition to other risks.

Given that it may be in the public interest for LDCs to implement risk-management programs that incorporate the use of financial derivatives, we discuss various issues pertaining to the regulatory review of such programs. We do this largely by posing questions that regulators may want to ask as part of their review process. Lastly, we note that it may be quite challenging for regulators to establish specific standards by which to evaluate hedging-program proposals. Such standards are likely to evolve and advance as a PUC's experience with and understanding of risk-management programs grows. As a consequence, the regulatory risk of hedging-program implementation and operation will become better defined. One of the intended purposes of this report is to provide PUCs with some sense of a reasonable starting point in their effort to evaluate hedging-program proposals.

---

[6](...continued)
prices, somewhat unexpectedly, will trend up while retaining the risk or chance that prices will trend down. That is, the LDC may prefer hedges that protect against the "upside risk" but retain the "downside risk."

## PRICE VOLATILITY AND RISK MANAGEMENT

To gain a more comprehensive understanding of risk management, it is necessary to have a good understanding of those factors or variables that contribute to price volatility. In pursuit of that understanding, and for the purpose of providing some background, we offer a brief and basic explanation of the 2000-2001 winter price spike.

### Sources of Increased Gas-Price Volatility

During the winter of 2000-2001 it was clearly revealed that the natural gas market is influenced by a vast array of factors: actual weather, gas in storage (i.e., gas inventory), available pipeline capacity (which may have a strong influence on local gas prices), forecasted weather, power plant operations, and less important factors. It was also clear that the expectations of future conditions have a strong influence on the market. For instance, when the concern or expectation arose in mid-December that a physical shortage of gas could develop before winter's end, it set the stage for aggressive buying among those gas consumers, namely LDCs, that have an obligation to serve. The result was a price spike of staggering proportions pushing the price of gas to a new record, more than double the previous record set years ago. And just as quickly as prices spiked up on the fear of a shortage, they spiked in the opposite direction when the fear of a shortage started to subside in early January.

Concerns about physical shortages are, at least in part, driven by the reported quantity of working gas in storage. With the recent increased use of natural gas to fuel summer-peaking generation plants, prior to the winter heating season there will be increased competition between placing gas in storage and immediate consumption. That increased competition increases the risk that the amount of working gas in storage at the start of the heating season will be less than the planned amount. Through the gas storage function and the increased use of natural gas to fuel summer-peaking power plants, the structural link between summer weather risk and winter gas price volatility has been strengthened. Consequently, for the foreseeable future, the gas market may be more susceptible to price spikes over the winter months. Even if gas prices moderate over the near term, the volatility of gas prices over the 2000-2001 winter may still recur. It has been suggested that it took years for the energy markets to get into their current situation and that it will take years to get out.[7]

## Does Price Volatility Reduce Consumer Welfare?

Noting that current gas-price volatility, having increased from previous time periods, is relatively high, and may remain so for the foreseeable future, what is the implication? From the consumers' perspective identifying the implication is rather straightforward: increasing price volatility suggests the possibility of monthly gas bills that are more volatile. That contingency depends in large part on the LDC's reliance on PGA-type provisions, which we discuss below.

As a general proposition, increased gas-bill volatility harms risk-averse consumers. Following standard economic theory, the average

[7] See "Fears of Tight Supply Boost Natural-Gas Prices," *Wall Street Journal*, April 10, 2001.

household consumer is assumed to be risk averse. On that assumption, the average residential consumer is willing to incur an expense for purposes of avoiding volatile gas bills. Any recognition of increased gas-price volatility suggests a possibly greater demand for risk-management services by residential natural gas consumers. To be clear, if regulators believe the average LDC customer is risk averse, increased gas price volatility implies the average customer would be willing to pay something to avoid that increased risk. It is not that risk management can protect consumers from high prices; rather, at some cost, it can protect consumers from unanticipated price spikes like the one experienced in mid-December 2000.[8] The pertinent question becomes: how might that protection be provided to household consumers given that they may be increasingly willing and able to pay for that protection?

That question has several answers. In general, there are numerous ways to provide risk-management services. The purpose of this report is to offer a sample of some of the possible answers. Although, we focus our attention on ways to manage price risk, LDCs may be able to manage their customers' weather risk, but the instruments for doing so are currently less popular and more costly than the price hedging instruments. Presuming that both weather and price are somewhat comparable as sources of gas-bill risk, it makes economic sense to use the least costly risk-management tools as the first line of attack. Hence, our focus here is on price-risk management using financial derivatives.

---

[8] The key word is "unanticipated." It also highlights the fact that the timing of risk-management decisions is critical. Once a price increase is either in our midst or fully anticipated by the market, it is of course essentially too late to seek protection. The "timing" issue makes managing price risk a real challenge that must be dealt with as part of any risk-management program.

# BRIEF DESCRIPTION OF DERIVATIVES AND DERIVATIVE MARKETS

This section introduces the concept of financial derivatives and how they can be used for hedging. The section also provides a brief overview of the history and functioning of gas futures and options markets.

## Defining Derivatives as Vehicles for Hedging

Futures contracts and options are examples of derivatives. Derivatives are the instruments that are used to provide risk management. The instruments or tools of risk management are referred to as derivatives because their financial value is completely derived from economic variables that have a more basic nature. For example, the value or price of natural gas futures and options depends upon the price of physical gas in the spot market. In general, the price of derivatives is highly correlated with the cash-market price of their underlying variables. Thus, when the spot price of gas increases or decreases so too does the futures price of gas, and vice versa. It is the correlation between the price of derivatives and the price of their underlying variable that makes risk management possible. To gain some sense of what we mean by this correlation of value, we offer the following example.

Consider an LDC that routinely purchases gas on a monthly basis, paying the monthly index price. Because an LDC is purchasing its gas at the monthly spot price, it is exposed to all possible variations in the monthly index price. Specifically, when the index price increases (decreases) the LDC, and ultimately its core customers, will pay more (less) for gas. From a certain date in time, say $t_0$, to protect against the possibility of unexpected future changes in the spot price, the LDC can use natural gas futures contracts. In this case, the LDC would need to purchase futures contracts at time $t_0$. Note, however, that the futures contracts are purchased for hedging purposes only, and not because the LDC will actually take delivery of physical gas under those contracts. By purchasing gas futures contracts, the LDC can effectively lock in a gas price for when it next purchases physical gas.

In illustrating this, we assume that the spot price and the price of futures contacts are highly correlated. With a high correlation, when the spot price increases so will the price of the LDC's futures contracts. Consequently, the LDC's futures contracts become more valuable. It is precisely that increase in the futures value that can be used to offset the increase in the spot index. In essence, with a hedge in futures contracts, the profitability of futures contracts increases just as the spot price increases. Under certain conditions, the profit gained on the futures contracts will exactly equal the subsequent increase in the spot index. Thus, if the futures profit gained since $t_0$ just equals the increase in the spot market price since $t_0$, and if that profit is used as a credit against the spot price increase, then when the LDC enters the spot market to buy physical gas it will effectively purchase its gas at the spot market price that prevailed at $t_{0.}$ Equivalently, in this example, by purchasing futures contracts at $t_0$, the LDC can effectively lock in the spot market price prevailing at time $t_0$.

Using profits on derivatives to offset or reduce subsequent increases in spot market prices is perhaps the most fundament example of risk management, and we offer it here as our basic example of hedging.

By hedging the LDC can provide protection against the subsequent increases (that is, those occurring after the hedge is in employed, at time $t_0$) in the spot price of gas. When hedging with futures, the LDC is protected against both increases and decreases in the spot market price.

It is worth noting that besides using derivatives to hedge, there remains what can be considered a more traditional approach to hedging, namely, the long-term, fixed-price contract for physical gas. For instance, is it not true that the holder of a gas contract with a term over, say, the next five years at a fixed price of $5.08 per MMBtu protects the holder from all subsequent changes in the spot price over that term? This is an example of a forward contract. For hedging purposes, forward contracts provide an alternative to the slightly more exotic futures contracts.[9] Forward contracts were commonly used by LDCs prior to the deregulation of the wellhead gas market. The reason for mentioning this is that all state PUCs are likely to have had experience evaluating forward contracts. The knowledge gained from that experience can be used as a foundation for evaluating hedging programs that rely on derivatives.[10]

---

[9] A forward market has the features of actual physical delivery of the commodity, plus uniqueness of a contract, which results in greater risk and less liquidity. As discussed later, in contrast a futures market is a derivative market where physical deliveries are rare and standardized contracts are fully tradable. Thus, it has lower transaction costs and greater liquidity.

[10] It is true that long-term, fixed-price contracts are far less common now. Most gas contracts, regardless of term, have prices that are pegged to a spot index. Clearly, such contracts expose the purchasers to all variations in the indices.

## Actual Natural-Gas Derivative Markets: A Brief History

Gas futures were first offered by the NYMEX in April 1990. Options on gas futures contracts began trading in 1992, thereby providing an additional tool, and thus opportunity, to manage price risk.[11] The popularity and use of options has continually increased since that time. With the availability of options, LDCs have access to an infinite number of risk-management strategies. In 1995, a gas futures market (at the Waha Hub) was established by the Kansas City Board of Trade. This new market was formed largely because of the inability of the NYMEX market to capture all gas price fluctuations outside the eastern U.S. market.[12] The new futures market was intended to improve price discovery in the West Texas producing area and those North American markets basically west of the Rockies. The Waha Hub contract was recently converted to a "basis contract" that is designed to capture the price difference between the Henry Hub and Waha Hub spot market prices. The Waha Hub contract now provides a more efficient way to hedge against price distortions that result when pipeline links between the eastern and western gas markets become congested. That is, the Waha Hub offers an excellent way to hedge against a certain kind of pipeline grid congestion. Incidentally, an understanding of how the Waha Hub contract can be used to hedge against pipeline congestion can be transferrable to

---

[11] The NYMEX is both regulated and self-regulating. The Commodities Futures Trading Commission is responsible for overseeing futures markets.

[12] The more heterogenous the price movements between the Henry Hub (which is the delivery point for futures contracts trading in the NYMEX) and the other hubs, the less traders in the other hubs are able to use the futures market to hedge; the reason is the presence of basis risk, which will be discussed later.

electric futures contracts designed to hedge against electric grid congestion—which is exactly one of the problems confronting the California grid.

## Other Functions Performed by Natural Gas Derivatives

Besides their facilitation of hedging activities, derivative markets, in particular the futures markets, perform several valuable functions for society. In this section, we offer a brief descriptions of those basic functions.

### Facilitate Speculation

Producers, marketers, arbitrageurs, speculators, wholesale and retail buyers of natural gas participate in the gas derivative markets.[13] In recent times, "hedgers" are primarily interested in avoiding price volatility, but they may also be interested in avoiding an adverse price movement. For instance, producers hedge against prices going lower, while marketers and other buyers such as gas utilities hedge against prices going higher. Indeed it is generally recognized in the economics literature that actual hedging decisions may be based upon two major considerations or components: (1) the hedger's desire to avoid price volatility, and (2) the hedger's expectation of future price trends. The latter component is sometimes referred to as a "speculative component." In contrast, the

[13] Futures contracts are commonly used by these participants as a financial-management tool, with traders meeting their contract obligations by taking an equal and offsetting futures position.

more traditional description of a hedger is of someone whose only concern is price variance and, therefore, sees hedging as a means to avoid price volatility.[14] A couple of points should be made here. One, it may be quite reasonable for LDCs to partially base their hedging proposals on their expectation of possible price changes.[15] Two, since modern hedgers may attempt to "kill two birds with a single stone," the line between hedging and speculating can be quite thin. Because of this, regulators face an added challenge when assessing the reasonableness of an LDC's hedging program.

Speculators are not concerned with avoiding price volatility. To the contrary, speculators may profit from price variation. On the other hand, hedgers are interested in avoiding or shedding price variation and, therefore, are looking for traders that will assume that risk. Hedgers are more interested in obtaining price fixity, while speculators seek price change. While not perfectly true, it can be said that hedgers and speculators are like a match made in heaven. In general, speculators play a critical role in derivative markets for they are willing to assume the risk that the hedgers seek to shed. Mostly, speculators assume the risk that is shifted from hedgers.[16] It is precisely the facilitation of risk shifting that

---

[14] From the more traditional view of hedging comes the description of a *bona fide* hedger. A *bona fide* hedger is only concerned about price volatility or variance and, consequently, hedges to lock in a fixed price regardless of future price expectations.

[15] For instance, an LDC that expects the price of gas to fall, relative to the market's expectation, may embark on a more limited hedging program. Whereas, if the LDC's relative expectation was for the price of gas to rise, it may launce a more aggressive hedging program.

[16] Speculators play a valuable role by adding liquidity to the futures (continued...)

provides gas market participants the opportunity to manage their risks, taking on more or less risk as they see fit. In some circles, speculation is not held in high regard, with critics believing that speculation lies at the heart of recent price spikes. It may be worth noting, however, that speculators can profit from price movements either up or down. Consequently, it is not exactly clear that speculators prefer upward spikes, though downward spikes are limited by zero prices. That is, because there is more room for prices to go up than down, it is possible for speculators to favor upward price movement. Nevertheless, derivative markets devoid of speculative activity would most likely reduce market liquidity and raise the cost of hedging.

### Risk Management and Customer Choice of Pricing Options

After a slow beginning, natural gas participants have made extensive use of the futures market to manage risk. Once the gas futures market became more liquid and market participants became better informed, the futures market took off. Marketers, for example, started to use the futures market so that they could offer gas to their customers under an array of different pricing options—from fixed prices to prices within a certain range. Most recently, some gas utilities have begun, or are considering, using hedging with financial derivatives as a means of

[16](...continued) market, which enables traders to enter and exit the market at low cost when the situation calls for it.

offering their customers gas at fixed prices.[17] For example, some gas utilities, in direct response to competition from independent marketers, are offering their large-volume customers fixed-price gas supplies. Hedging is invariable an inevitable component of such pricing plans.[18]

## Price Discovery

Price discovery is another major economic benefit of futures trading. Because of the large trading volume in the NYMEX futures, the Henry Hub price for the near-futures contract (which is that futures contract closest to the current month) indisputably contains more market information compared to all other less widely traded gas contracts. This implies that the NYMEX futures price provides the best indication of the current economic value of natural gas to society. In short, by having a highly liquid gas market, such as the gas futures market, the price revealed in that market is a good indication to traders everywhere of the true economic value of gas. It can be argued that, absent pipeline congestion, the Henty Hub price provides a basis for setting gas prices throughout the eastern United States.

---

[17] One such example is the recent proposal by New Jersey Natural Gas to provide fixed-price service to residential customers during the peak season and on an annual basis.

[18] See, for example, Steve Everly, "Regulators, Utilities Look for Ways to Smooth Out Spikes in Natural-Gas Prices," www.kcstar.com/item/pages/business, March 5, 2001.

## Price Transparency

With its price transparency, the gas futures market is widely used as a pricing benchmark or reference point for all forms of gas contracting, including spot contracts.[19] To many market participants, for reasons stated above, the NYMEX futures prices represent the best available information on near- and medium-term natural gas prices.[20] Thus, the standard practice among buyers and sellers alike is to at least check the latest futures price before signing any contract. That way spot-market traders gain a big-picture view (in terms of both an extended geographic scope and time horizon) of the value of gas. Having such a broad-based view offers physical-gas contractors a means to better assess their local gas opportunities and, hence, negotiate their local gas deals. Thus, for a small farmer in Western Kansas who uses natural gas to run his irrigation pumps, by checking the Henry Hub futures price he immediately gains a sense of what prices are truly realistic in terms of negotiations with the local gas marketer. The same holds for the gas marketer. With a highly liquid gas-futures market that offers unparalleled price transparency, a great deal of conjecture is taken out of the price negotiations between contracting parties everywhere.

---

[19] The NYMEX prices are commonly used as price references for wholesale gas transactions.

[20] Prices discovered at futures exchanges are widely used as today's best estimate of tomorrow's cash market prices for a standardized quantity of a commodity.

## Least-Cost Hedging

For hedging purposes, compared to a forward market the futures market has lower transaction costs and more liquidity.[21] Lower transaction costs result from less searching and quibbling over price setting. A futures market is also more liquid[22] than a forward market, since a futures contract represents a standardized agreement between two parties that can be easily transferred to other parties.[23] In contrast, a forward contract involves physical delivery and differs in its detail on a transaction-by-transaction basis. The uniqueness of each bilateral contract makes it more risky and costly for the parties to resell the contract to a third party. Consequently, the parties entering forward contracts take on more risk, thereby attaching a higher risk premium to transactions than under a futures contract where the parties can more easily and more cheaply get out of the contract. In general, there is greater ease of both entry and exit for futures contracts, which keeps their transaction costs lowest among all contracts. For purposes of hedging price volatility, this suggests that it is generally less costly for the LDC to use futures contracts compared to forward contracts. We would note, however, that in consideration of certain operating risks, it may be

---

[21] See, for example, Dennis W. Carlton, "Futures Markets: Their Purpose, Their History, Their Successes and Failures," *Journal of Futures Markets* 1 (1984): 237-71.

[22] A market is said to be liquid when traders can quickly buy or sell a futures contract at a low transaction cost.

[23] Standardization promotes liquidity, with traders having to focus only on price and the date of expiration of a futures contract.

reasonable to use forward contracts. For example, where pipeline congestion is a likely problem, fixed-price forward contracts may be the preferred alternative.

## Basic Features of a Successfully Traded Futures Contract

A futures market must have certain features to be successful over time: (1) high demand for and supply of the underlying commodity, such as natural gas, so that there is a broad commercial interest in the futures contract, (2) contracts that are sufficiently standardized while being highly representative of actual commercial practices, so that it is easy to enter and exit contracts, (3) significant price volatility, so that speculators have sufficient interest in the contracts, (4) an underlying spot market that is unconstrained by government controls and, therefore, is highly responsive to new market conditions, and (5) a viable delivery (or cash settlement) mechanism, so that spot and futures price correlation is operationally supported.[24] In general, the structural features of a successful futures market will mimic, as closely as possible, those of a competitive market. The NYMEX gas futures market possesses these features. In fact, the NYMEX natural gas contract is one of the most successful futures contracts as measured by the dollar value of traded contract volumes.[25]

---

[24] A viable transportation system helps to ensure a high correlation between cash prices and futures prices.

[25] Suggestions that manipulations of the NYMEX gas futures market explain some of the more recent price spikes, particularly those that occurred during the 1996-1997 winter, have been unsubstantiated by empirical evidence. It's worth noting that if a futures market price can be manipulated by an exercise of

(continued...)

During 1999, at an average annual price of $2.32 per MMBtu, the natural gas futures and options trading at the NYMEX exceeded $534 billion. At currently expected prices, that figure could exceed one trillion dollars during 2001.

## RISK MANAGEMENT BY AN LDC

The primary focus of this report revolves around participation by LDCs in derivatives markets for purposes of hedging against possible rising prices or possible price spikes in the spot market. There are a number of different ways to accomplish that objective. Two of these include: (1) purchasing futures contracts, and (2) purchasing call options. A combination of the two could also be used. Although slightly more complex, the use of swaps is a third alternative.

### The LDC's Incentive to Hedge

Gas LDCs that are allowed to use pass-through mechanisms for gas expenses may have very little incentive, from the shareholders' perspective, to hedge. The incentive to hedge depends in part upon the

[25](...continued)
market power, the market is probably doomed to failure. Any expectation that some traders in the futures market may have a market power advantage will drive all other traders away. When liquidity and trading interest are lost, the advantage of holding market power is greatly reduced, which further reduces trading interest and liquidity. If market power problems are revealed in a futures market, it can lead to a death-spiral. Consequently, the futures exchanges have a huge incentive to insure the structural integrity of their markets. That is, because the exchanges generate revenues through transaction fees, the more popular or widely traded a contract is the greater the exchanges' revenues are.

frequency with which the pass-through gas price is updated. Monthly updating exposes shareholders to less risk (and lower working cash requirements) than quarterly updating. The incentive to hedge also depends on the mix of contracts in the LDC's gas supply portfolio. A heavy reliance on daily gas contracts implies a portfolio with greater price exposure. For LDCs that rely on pass-through provisions, however, hedging may produce large benefits to core customers. Clearly, when an LDC employs a pass-through mechanism its core customers are exposed to changing gas prices; that is, in addition to passing through the price, the LDC also passes through the price risk. While PGA-type mechanisms create a lag, and perhaps some smoothing under averaging, price spikes are almost always passed through in some form.

On the other hand, for LDCs that do not rely on pass-through mechanisms the opposite holds: shareholders are exposed to the financial risk inherent in regulatory lag while core customers are insulated from gas price changes. The financial risk of regulatory lag is increased during periods of increased input price volatility, such as this past winter's experience in the natural gas market. Price changes will catch up to customers via rate cases, but even then the changes arrive in the form of adjustments that are themselves the result of averaging. Overall, LDCs that have pass-through provisions may have an incentive to hedge only to mitigate price volatility for their risk-averse core customers; while LDCs that lack pass-through ability may have an incentive to hedge on behalf of their shareholders. In the case of a speedy pass-through of gas costs, hedging may help to maintain or build customer goodwill and, consequently, sales volumes.

Perhaps more important, hedging stands to shield customers from the most severe price spikes during the coldest (and, thus highest sales) periods of the year. Such protection, by keeping maximal gas bills down, helps prevent customers from falling behind on their bill payments. That, in turn, prevents customer goodwill from eroding, keeps customers on the system, and reduces the LDC's financial risk from nonpayment. In the case of delayed recovery of gas costs, hedging can reduce the size of the LDC's working cash requirements, possibly reduce the frequency of rate filings, and possibly provide a better match between the LDC's actual risk exposure and actual rate of return.

## Hedging With Futures: An Illustration

Consider an LDC that relies on a pass-through mechanism and, therefore, would be hedging on behalf of its core customers. To provide that hedge, the LDC would take what is referred to as a long position in the gas futures market. A long position is obtained by purchasing futures contracts.

To explain how this hedge works, we offer the following hypothetical. Suppose the LDC buys, at the beginning of some month, a spot market gas contract for 10,000 MMBtus of gas for next month with the actual price of that gas to be determined by next month's spot index price.[26] To keep the example simple, suppose the location of that spot gas is at the Henry Hub. Suppose also the current spot price is $5.00 per

---

[26] By holding the assumed spot contract for gas, the LDC has what is referred to as a short position in the spot market. By having a short position, the LDC has positioned itself to receive gas. From the example, the LDC is short 10,000 MMBtus of gas in the spot market.

MMBtu. Thus, at the beginning of the month, the LDC enters a spot contract for physical gas to be delivered and paid for next month. The LDC agrees to pay next month's index price. Finally, we assume that at the time this contract is entered the spot market price stands at $5.00.

In order to perfectly hedge that spot market contract – that is, avoid having to pay a price any greater or less than $5.00 – the LDC should purchase one futures gas contract for next month at roughly the same moment it signs the spot market contract.[27] Presuming this is done, let us suppose the LDC buys a NYMEX futures contract for the near month (that is, the next month) for $5.50. At the moment the LDC places the hedge, it will simultaneously hold a spot market contract for 10,000 MMBtus worth $5.00 per unit and one futures contract for 10,000 MMBtus of gas worth $5.50 per unit.[28] Having hedged, the LDC is protected from changes in the spot market price until the next month arrives. In this example we will assume the spot and futures prices are perfectly correlated.

To show how the hedge offers protection against changes in the spot market price, suppose the spot market price increases over the month so that just as the first of the new month arrives the spot market

---

[27] By purchasing a futures contract, again, the LDC takes a long position in the futures market. By taking a long position, the LDC has positioned itself to deliver gas. As long as the LDC holds a long position in the futures market, it has an obligation to deliver gas to the futures market. From the example, the LDC is long 10,000 MMBtus of gas in the futures market.

[28] In this illustration, the LDC's short and long positions are the same size, 10,000 MMBtus. Hedgers that keep their short positions (in the spot market) equal to their long positions (in the futures market) are frequently referred to as *bona fide* hedgers. *Bona fide* hedging, where long and short positions are equal, is one example of a standard benchmark for evaluating hedging behavior.

price stands at $5.75; thus, we assume that since the spot contract was signed, the spot price has increased by $0.75 per MMBtu. The LDC is now obligated to pay $5.75 for the 10,000 units of spot gas. That is the bad news. The good news is that the futures contract, under our assumptions, will now be worth $6.25 per MMBtu. Obviously, that is a gain of $0.75 per MMBtu. The LDC can exactly capture that gain by selling its futures contract, which amounts to a $7,500 profit on the futures contract. Thus, at the moment the LDC actually purchases its physical gas under the spot contract at the monthly index price of $5.75, it should simultaneously sell (at $6.25) its futures contract. In this example the amount of value lost from the 75-cent increase in the spot price is perfectly offset by the 75-cent gain in value in the futures price. By purchasing the spot gas at $5.75 and passing through the futures contract profit of $7,500 to its core customers, the core customers' effective purchase price of gas is exactly $5.00. That is identical to the spot price that existed at the moment the spot contract was signed one month earlier. By hedging, the LDC protected its core customers from paying more than $5.00. In the absence of hedging by the LDC, customers would have paid $5.75.

This example leads to the following general comments:

- To capture the gain on the futures contract, the LDC must sell the futures contract. By selling the futures contract that it had purchased roughly one month earlier, the LDC eliminates its obligation to deliver physical gas to the futures market. Equivalently, by selling, the LDC eliminates its long position in the futures market. Such an elimination is frequently referred to as an offset.

- The LDC holds a futures contract strictly to establish the hedge. It does not hold the futures contract because it wants to go through with it—that is, it does not plan to actually deliver gas to the futures market. Because it is holding the futures contract for only hedging purposes, it must offset that contract before it expires. All futures contracts that are actually held at the time of expiration must be acted upon.[29]
- For hedging to be as effective as possible, the timing of all transactions is critical. In particular, the spot contract and the futures contract should be entered at approximately the same time. If not, then advantageous price changes and, thus, profits on the futures contract can be forever lost.
- The assumption that the spot and futures price changes are perfectly correlated is extremely strong. In reality, the correlation is never 100 percent.[30] Consequently, because there are no perfect hedges in the real world, it is unlikely that the LDC will be able to absolutely "lock in"' some price. A more realistic example might be one where the futures price

---

[29] Generally, only a small fraction, less than two percent, of futures contracts is held through expiration. That shows that the vast majority of futures contracts are held for hedging and speculative purposes. They are not held for purposes of ultimately receiving or delivering physical gas. That is, they are generally not held for commercial purposes.

[30] There are a number of reasons for this. A related question is whether futures prices influence or lead spot prices, or vice versa. Analysts who have studied this tend to support the view that futures prices lead spot prices. The explanation for this is that futures prices seem to respond more quickly to new information, as futures transactions can be carried out almost immediately with little up-front cash, while spot purchases require a greater initial outlay and usually take longer to carry out.

increased slightly less than the assumed $0.75 per MMBtu, say $0.71. In that case, the LDC's core customers would not see an effective gas price of $5.00 but rather $5.04.

- Transaction costs are associated with buying and selling futures contracts. Risk management is definitely not a cost-free activity. Furthermore, hedgers may have to offer a risk premium—this has an effect comparable to reducing the correlation between futures and spot price changes. This is yet another hedging cost. All of these risk-management costs, including the costs of effectuating the hedge, must be passed through to the beneficiaries of the hedge—namely, the core customers. Hedging costs can be in the range of 2 to 3 cents per MMBtu. Adding in these risk-management costs to our example means core customers would pay a total of $5.02 or more for their gas.
- Other than the transaction costs and the possible payment of a relatively nominal "risk" premium, no other up-front costs associated with futures contracts exist.
- Finally, suppose the spot price decreased rather than increase. Suppose over the month the spot market price fell to $4.45. In that case, the LDC would lose money on its futures contract. The loss would amount to $5,500. Thus, the LDC would buy its physical spot gas at $4.45, passing through that price. It would also pass through the loss on the futures contract. The effective pass-through price would exactly equal $5.00. With the exception noted above, hedging means locking in a price as of a certain point in time. If prices

increase after that time, the locked-in price ends up looking relatively good to consumers. When prices fall, on the other hand, consumers will be less than enthralled with having that relatively high locked-in price. Aggravating the situation, when the hedging costs are added in, customers will be even less happy.

This final point is critical. When futures contracts are used for hedging purposes, the LDC is effectively locking in a price that will hold for some period of time. If, over that time period, the spot price increases, the locked-in price looks great in comparison and customers (as well as regulators) will be pleased. Instead, if the spot price decreases, the locked-in price becomes less attractive. Customer complaints are possible, as is second guessing by regulators. Most LDCs may prefer to avoid both of those potential problems and their associated risks. As a practical matter, when using futures contracts to hedge, those potential problems cannot be avoided. Using futures as a hedging vehicle means the customers are protected from increasing prices, as well as decreasing prices. Because consumers may be more concerned about upside price volatility compared to downside price volatility, the LDC may prefer a risk-management strategy that would retain the downside risk. Regulators may also find that approach to be reasonable. Regulators may in fact prefer risk-management strategies that shield consumers from the upside risk, while keeping the downside risk. [31]

[31] The next section discusses the reason for this.

## Hedging With Options: An Illustration

In this section we offer a basic example of how an option can be used by the LDC to effectively install a price cap, thereby protecting customers from prices increasing beyond the cap. As with any price-cap arrangement, customers are at risk for paying any price at or below the cap. Options can be used, however, to simultaneously establish both caps and floors which, when used in combination, amounts to a price collar. With a price collar the LDC can effectively lock in a range of prices, thereby leaving customers exposed to the risk that prices will fall somewhere within the range.

The LDC can establish a price-cap hedge by purchasing call options.[32] By purchasing a call option, the holder has the right, but not the obligation, to purchase gas at a pre-determined price, called the "strike price" or "exercise price." As a practical matter, the strike price, with some minor adjustments, becomes the price-cap level for consumers.

To illustrate how a call option can be used to set a price cap, we go back to our previous example. Again, suppose the LDC enters the very same spot contract and that at the moment that contract is entered the spot price is $5.00 per MMBtu. Now, rather than purchasing the next month's futures contract, suppose the LDC buys a call option that holds for next month, with a strike price of $5.10. Again, suppose the spot market price increases over the month so that just as the first day of the new month arrives the spot market price stands at $5.75; we therefore

---

[32] Gas options are available in both the NYMEX and the over-the-counter (OTC) market. The OTC market provides greater opportunities for tailoring contracts to the preferences of individual traders, but, as a result, is less liquid.

assume that since the spot contract was signed the spot price increased by $0.75 per MMBtu. We also assume that the spot market price and the value of options are perfectly correlated.[33]

Since the market price at the start of the month exceeds the strike price, it makes sense for the LDC to exercise the option in order to capture the difference. That is, by exercising the option, the LDC will realize a gain or profit on the option equal to $0.65 per MMBtu ($5.75 - $5.10). That yields a total profit to the LDC of $6,500.

Under the spot contract and having exercised its option, the LDC will pass through the $5.75 per MMBtu price for gas plus the option profits of $6,500. Together that yields an effective pass-through price of $5.10 per MMBtu. Thus, by having purchased a call option with a $5.10 exercise price, the LDC can effectively cap the price of gas for its customers. Under our assumed conditions, the price cap level will be equivalent to the option's exercise price.

This example conveys the following general points:

- To capture the gain on the option, the LDC must simply exercise the option. If the market price is anywhere below the strike price, the option would not be exercised, nor would the LDC be under any obligation to deliver gas.
- In order for the hedge to be as effective as possible, the timing of all transactions is critical. In particular, the spot contract and the option should be entered at approximately the same time. If not, then possibly advantageous price changes and, thus, profits on the option can be forever lost.

---

[33] This is equivalent to our assumption that spot market and futures prices are perfectly correlated.

- Call options require a cost to purchase. To repeat, providing risk management is not cost free. Let us suppose it cost \$0.15 per MMBtu to purchase the \$5.10 call option. (That purchase price is also called the "option premium.") The cost of the option must be passed through to the beneficiaries of the hedge—namely, the core customers. Adding in the cost of the option premium means core customers would pay a total of \$5.25 (\$5.10 + \$0.15) for their gas.
- In general, lower strike prices command greater premiums. Other factors also influence the size of option premiums.[34]
- Finally, suppose the spot price decreased instead of the assumed increase. Suppose over the month the spot market price fell to \$4.45. In that case, the LDC would not exercise its call option. Thus, the LDC would buy its physical spot gas at \$4.45, passing that price through. But it would also pass-through the cost of the option. The effective pass-through price would then equal \$4.60 per MMBtu (\$4.45 + \$0.15). By using the call option, the LDC's customers are protected from price increases (beyond the cap), but they also retain the ability to benefit from price decreases. In short, options enable consumers to be protected against upward price changes while retaining the possibility of gaining from downward price

[34] Options have three major features: (1) for any termination period, the lower the strike price for a call option, the greater will be the premium required of a buyer; (2) the longer the time to termination of an options contract, the higher will be the price of the option (premium); and (3) as price volatility increases, option premiums also increase. The last results from the fact that an option has a greater chance of being profitably exercised as price volatility increases.

changes. With options, some of the upside price risk is eliminated while some of the downside price risk is retained.

By using call options, the LDC's effective cost of (or losses from) risk management is capped. Its core customers' effective cost of (or losses from) risk management is also capped. That is not so when futures contracts are used as the hedging vehicle. In our examples, and ignoring all risk-management costs, when the LDC used futures its customers got a locked-in price of $5.00, with no chance of paying either a higher or lower price. When the LDC used the call option its customers got a price cap at $5.10 per MMBtu, yet they retained the possibility of paying any price below the cap (including prices less than $5.00). On the other hand, the use of options required an up-front payment of $1,500, analogous to the payment of an insurance premium, whereas the use of futures contracts requires no such payment.[35] That cost can be regarded as a "commitment cost." In general, the up-front cost is potentially far greater for options than for futures. Depending on how low a price cap the LDC may prefer, the "insurance premium" associated with using options can be significant. Furthermore, if the options should go unexercised, then the LDC will not be able to recover any of that expense from the marketplace.

[35] Margin payments are required by those that hold futures positions; unlike the options payment, however, margin payments may be effectively returned in full.

## Hedging With Swaps: An Illustration

Swaps are a third type of derivative that can be used for hedging purposes. Swaps are private agreements and, for commodities, are generally over the counter (OTC) instruments. Through a swap, two parties will exchange cash flows at a future date according to an agreed-upon formula. As an example of a swap, we offer the following.

As with the other derivatives, swaps are a financial arrangement. As with our other examples, we assume the LDC is largely interested in avoiding price volatility. Therefore, the LDC will seek an arrangement where it agrees to buy at a fixed price and sell at a variable or floating price. Accordingly, the LDC is seeking a counter party or trader that will agree to sell at a fixed price and buy at a floating price. Presuming the LDC can find such a trader, it will negotiate and set a fixed price as well as identify and specify the floating price (usually a published price index). Lastly, the two parties set or designate a time frame for their arrangement. Having made those agreements the swap arrangement would work as follows.

At the designated time, if the index price exceeds the fixed price, then the trader pays the LDC the difference. Consequently, the LDC is protected from paying more than the fixed price. If the index price is less than the fixed price, however, the LDC must pay the trader the difference. Thus, the trader is protected from receiving a price less than the fixed price. In any event, the LDC pays the fixed price and is protected from index prices that vary from that fixed price. Absent the swap, the LDC would pay the index price for its gas and, therefore, would be exposed to the volatility of the index. With the swap, the LDC trades away that volatility and effectively purchases its gas at a fixed price.

Swap arrangements are similar to having hedged with futures contracts. Compared to futures, swaps offer an opportunity to obtain a more specialized hedging arrangement and for that, as well as other reasons, may be more expensive to use.

## Additional Observations on Hedging

The following section offers several general observations on hedging. They are as follows:

1. Whether a gas LDC should hedge may depend on its pass-through provisions. If the LDC does not rely on a PGA-type mechanism, it would be more inclined to hedge. Yet, it is not clear that the LDC should always hedge. For those LDCs, the risk-management question deals mainly with their need to stabilize internal cash flow. According to modern finance theory, supplemented by empirical studies, firms mostly hedge as a risk-management tool to stabilize internal cash flow.[36] Specifically, hedging allows a firm to better align its demand for funds with the internal supply of funds. In other words, it can assist a firm in better managing its short-term cash flow and cash profits. With internal funds available when needed, a firm can always finance value-enhancing investments without

[36] See Kenneth A. Froot, David S. Scharfstein, and Jeremy Stein, "A Framework for Risk Management," *Harvard Business Review*, November-December 1994: 91-102.

having to incur the cost associated with outside financing. As noted above, an LDC's cash flow can be greatly affected by changes in the price of natural gas in the absence of a pass-through mechanism. The often-heard argument that firms hedge to reduce their stock price volatility receives little weight in the finance literature and by financial experts. The counter-argument is that individual investors through their portfolio strategies can better manage stock-price volatility. Besides, it is argued, large firms are usually owned by many small investors, each of whom bear only a small portion of the risk. The "stable cash flow" rationale for hedging is succinctly expressed by Froot, Scharfstein, and Stein:

> To develop a coherent risk-management strategy, companies must carefully articulate the nature of both their cash flows and their investment opportunities. Once they have done this, their efforts to align the supply of funds with the demand for funds will generate the right strategies for managing risk."[37]

Specific reasons for why an LDC, even in the absence of a PGA-type mechanism, may decide not to stabilize its internal cash flow by hedging with derivatives include: (1) the risk exposure may just not be high enough,[38] (2) the high fixed costs associated with hedging, a cost that shareholders could

---

[37] Ibid., 100.

[38] A firm's desire for undertaking hedging or other forms of risk management hinges on the size of its total risk – that is, the probability and size of potential losses determine the desire to hedge.

largely be responsible for, may be too high, (3) risk exposures could be better managed using mechanisms other than derivatives, such as fixed-price, forward contracts, (4) management may lack the knowledge to trade in derivatives, and (5) shareholders may prefer to assume the risks inherent in volatile gas prices (for instance, by hedging it can be argued the LDC should be granted a lower allowed rate of return on equity).

2. Most gas LDCs rely on pass-through provisions and, therefore, have a different exposure to price risk than unregulated firms. We have already offered some general reasons for why an LDC should hedge on behalf of its customers.[39] When the LDC concludes that it may be reasonable to hedge on behalf of its customers, other key questions follow: (1) how large should the risk-management budget be, that is, how much are customers willing to pay for risk-management services, (2) given the plethora of different risk-management strategies, which strategy may be the most preferred by customers, and (3) what standards or expectations do regulators have, if any, vis-a-vis hedging-program proposals? Answering these questions will be necessary in carrying out any LDC hedging program. Even if an LDC should decide not to implement a

---

[39] To largely motivate the discussion, we have made the assumption that retail gas consumers are risk averse and, therefore, would be willing to pay something to have stable prices.

hedging program, regulators may want to evaluate the evidence supporting the rationale underlying such a decision.

3. LDCs, as regulated entities, should refrain from harmful speculation. While hedging is intended to reduce price risk, speculation increases price risk. The temptation of speculation is certainly understandable, for speculation is simply an attempt to profit strictly from the purchase and sale of derivatives. Obviously, however, speculation in the derivatives markets can lead to financial ruin. Another complicating factor is that, as a practical matter, the boundary between hedging and speculation is not always clear.[40] Therefore, any hedging program should provide for a ready assessment by regulators, perhaps through monthly reporting requirements, so that there may be some safeguard against the LDC's hedging decisions becoming overly speculative.[41]

---

[40] Some concern may exist where a gas utility has an incentive to speculate even when offsetting a futures sale with a physical or spot market purchase. By definition, speculators hope to profit from an upward price movement in futures or options contracts. For example, a speculator could buy a futures contract for specific-month delivery with the intent to sell that contract at a later date for a higher price. Speculators neither own nor plan to own gas.

Let us assume a situation where a gas utility can easily pass through the cost of spot market purchases to consumers. This means it can recover its full costs for spot purchases whether the price of gas is $2 per MMBtu or $8 per MMBtu. In such an environment, the utility could easily position itself as a speculator in the futures market.

[41] Any LDC whose hedging decisions keep it close to being a *bona fide* hedger is probably going to be within the proper boundaries (see footnote 14 for the definition of a *bona fide* hedger).

4. The LDC's decision to hedge may be influenced by its expectation of future prices changes. For example, an LDC that expects prices to come down in the future, may decide to not hedge. On the other hand, a hedger that expects increasing prices may decide to hedge based, in part, on that expectation. Indeed, it is generally recognized in the economics literature that actual hedging decisions may be based upon two major considerations or components: (1) the hedger's desire to avoid price volatility, and (2) the hedger's expectation of future price trends. The later component is sometimes characterized as a "speculative component." Thus, while we suggest that LDCs should refrain from "harmful speculation," the literature has long recognized that hedging decisions are likely to be affected, in some way, by the hedger's price expectations. Consequently, it may be reasonable for regulators to recognize that the LDC's price expectations may be an integral part of any hedging program. Naturally, as regulators evaluate such programs, most likely they also will need to evaluate the LDC's expectations of future gas prices.[42] That comes precariously close to suggesting

---

[42] The marketplace provides us with an indication of the *market's expectation* of where future prices are headed. The 36-month futures price strip is precisely that. By checking the gas futures prices on the NYMEX, one can see where the market believes prices are going over the next 36 months. In short, the 36-month futures price strip is a sort of "crystal ball." When we refer to the hedger's expectations, it is on a comparative basis. That is, the hedger's expectations matter when they differ from the market's expectations. For instance, if futures prices show a 10 percent upward trend in prices over the next three years, but the LDC expects a 12 percent increase over the same period, that (continued...)

that, in evaluating the LDC's expectations of the future, regulators will need to evaluate the LDC's "crystal ball." Needless to say, that evaluation may invoke more art than science.

5. If the LDC's expectations are evaluated as part of the regulatory review process, the LDC may be particularly vulnerable to being second-guessed. For example, if the LDC expected increasing prices and, consequently, proposed to hedge, then if prices actually decreased and the hedge proved more costly as a result, the LDC may rightly be concerned about the regulatory repercussions. Regulatory risk may certainly discourage LDCs from even proposing hedging programs. If so, regulators should consider the use of an "up-front" approval process. The LDC's expectations should be evaluated within the context of the overall hedging proposal; but if the proposal is subsequently approved for implementation, that should arguably also "close the book" on the prudence question, regardless of where prices end up going. This suggests another possible concern: if an "up-front" approval process is used, that seems to imply that consumers are always at risk for the inaccuracy of the LDC's expectations on which actual hedging decisions may be based.[43] Because

---

[42](...continued)
may support a decision by the LDC to hedge.

[43] We also assume the LDC in question employs a pass-through
(continued...)

hedging would be performed on behalf of consumers, that would be reasonable. But it does highlight the importance of properly evaluating the hedger's expectations—the accuracy of which is nearly impossible to establish up-front. If the accuracy of hedger expectations could be established up-front, there would probably be little need for risk management. The reason for this is that if the accuracy of forecasts could somehow be determined up-front, then that suggests a world in which there may be no uncertainty, no risk. Overall, we think regulators will be challenged in their attempts to establish standards by which to review hedging programs.[44] And the more rigid the selected standards, the greater the challenge.

6. There are no perfect hedges out there. Change in futures and spot prices are not perfectly correlated. One of the factors that interferes with perfect correlation is basis risk.[45] In the two

---

[43](...continued) mechanism so that all price changes are being passed through to end-users. If the LDC does not have a PGA-type mechanism, it may decide to hedge on behalf of shareholders.

[44] Another possible challenge is clearly explaining to consumers the efficacy (and relative superiority) of the approved hedging program.

[45] A *basis* is defined as the difference between the quoted futures price for a specific delivery month and the cash or spot price at the local market. For storable commodities such as natural gas, the basis reflects both carrying charges and transportation costs. Hedging in effect represents a risk-management activity that reduces price risk to basis risk. A hedger can be described as a basis speculator, with the expectation that the basis is predictable and that basis risk is less than the price risk associated with the commodity. Mathematically, a perfect hedge exists when Spot Price = a+b (Futures Price),

(continued...)

illustrations offered above, assumptions were made that effectively ruled out any basis risk.[46] At this time, most of the major hedging tools available to the gas industry are designed for the Henry Hub. That means they are most efficient for hedging in the Henry Hub market. Yet, most LDCs transact in local gas markets far from the Henry Hub and, therefore, must be concerned with hedging the risks in those markets. The available risk-managements tools, however, are simply less efficient in those other market locations. Trying to improve upon that efficiency means the LDC must hedge the basis, which is yet another cost. Perhaps the principal factor behind locational basis risk is the prospect for gas pipelines to become congested. Naturally, such risk is far greater over the winter months. When pipeline congestion occurs, severe local gas shortages can develop.[47] With local shortages, local gas prices can significantly differ among locations, spiking in those congested pipeline markets. Henry Hub-based hedging instruments are not likely to provide protection against local price spikes. It is a greater challenge for LDCs that are

[45](...continued)
where "a" equals zero and "b" is stable and close to the value of one. Basis risk occurs when the prices for a particular commodity do not correlate well between regions.

[46] In general terms, the effective cost of gas for a utility hedging equals the locked-in price paid by the utility for a futures contract minus the basis (to recall, the basis is the difference between the futures price received by the utility for a specific delivery month and the cash price at the local market).

[47] A prime example is the experiences of the California natural gas market over the last several months.

plagued by pipeline congestion problems to achieve a high degree of price-spike protection for their customers. Even if they do meet that challenge, it could be very costly.

7. To repeat from earlier, hedging is not a costless activity since it requires one party to assume the risk (the speculator) passed along by another party (the hedger). That is why a call option requires the payment of a premium to the seller of an option; the seller must take a short futures position at the specified price, in the event that the option is exercised at that price.

8. Hedging should not be expected to reduce the average cost of gas purchases over time. Hedging can best be viewed as price insurance purchased for the purpose of avoiding the payment of high gas prices that could occur unexpectedly after the "insurance" is purchased. The intent of hedging is to stabilize prices, not to lower them. As a form of insurance, hedging protects a gas utility and its customers against financial adversity that could otherwise result from being exposed to volatile gas prices. As an analogy, when homeowners purchase insurance to protect against large losses from a fire or other catastrophe, their expected wealth declines. For the insurer to make a profit, the expected payout in claims must be less than the premium payments. Individuals buy homeowners' and other kinds of insurance

because they are risk averse.[48] By the same token, individuals and companies hedge because they are willing to pay to avoid an undesirable, high-cost outcome.

9. Futures, options and swaps can all be used as part of an LDC's hedging program. Options provide risk managers with great latitude in selecting risk-management strategies. Options can be used to set collars (where the price of gas is bound by a ceiling and a floor) and call spreads (where the LDC can lock in a price discount). In terms of designing hedging strategies, the sky is the limit.

## REGULATORY ISSUES

### The Overlap between Gas Procurement and Risk Management

A typical gas utility has wide discretion over where and how to purchase gas. It can also avail itself of different financial and physical options for managing price risk. Primary consideration is often given to factors that influence overall reliability, with pricing considerations also being important. For example, a gas utility can purchase gas from producers in geographically different supply basins or areas and from

[48] Risk aversion means that individuals and firms are willing to pay something (for example, a premium) to avoid the possibility of large losses or downward variability in their wealth.

marketers/brokers under a wide array of market arrangements. These arrangements, which can be in the form of either physical or financial-derivative transactions, include short-term contracts, storage, longer-term contracts, spot market purchases, vertical integration,[49] outsourcing, and financial derivatives. Hedging entails fixing the price at a prespecified level or in accordance with some formula that is deemed acceptable to the gas utility and its regulator. Hedging itself can involve storing gas, signing a forward contract, or transacting financial derivatives.

One question for gas utilities and their regulators, and the question underlying this report, is how hedging with financial derivatives fits in the scheme of an LDC's gas-management strategy. There is no simple answer to this question. Traditionally, the LDC's gas-management strategy would have encompassed the purchase of physical gas, but it might have also included the purchase of physical gas under fixed-price, forward contracts. In the case of forward contracts, the purchase of gas and risk management is absolutely bundled. Storage decisions are another example of decisions where gas and risk-management purchases are effectively bundled. Traditionally, LDCs have relied upon forward gas contracts and storage as a means of mitigating the price risk faced by their customers. We will note here, however, that the primary motivation for storage may have much more to do with maintaining service reliability than providing a winter price hedge.

By relying on financial derivatives, gas purchase and risk-management decisions can be completely unbundled. For example, the

[49] Vertical integration can act as a substitute for hedging with financial derivatives and forward contracts.

LDC could purchase all of its physical gas on an "at index basis" and then purchase financial derivatives to obtain the desired amount of risk management. Thus, the LDC could purchase derivatives to cover any proportion of its physical gas commitment. We would note that hedging with futures is generally more economical than hedging with forward contracts. Therefore, it may be both more economical and simpler for the LDC to keep its physical gas-purchase decisions separate from its risk-management decisions. It is certainly feasible, but it may also be quite reasonable for LDCs to keep their gas purchase decisions largely separate from their hedging decisions. Hedging programs can be implemented quite apart from the LDC's gas purchase program. We would expect gas purchasing to have a least-cost objective subject to the required reliability level.

Categorically, an LDC can provide risk management in two different ways. One, the LDC can provide it at the pass-through price level. Just as the LDC purchases gas on behalf of all of its core customers, it can purchase risk-management services on the same basis. Futures, options and swaps can be entered to hedge the LDC's pass-through price. Two, the LDC can provide risk management at the tariff level by allowing customers to select their preferred tariff. For example, an LDC could offer a fixed-price tariff where the price of gas would be held constant over a given time period, say, one year. Alternatively, the LDC could offer a price-cap tariff that would limit the maximal gas price—for example, a "collar" tariff would provide gas within a pre-set range of prices. As a matter of practice, the LDC could offer a broad menu of different risk-management tariffs. Each tariff would need to specify the actual or expected charge for providing the hedge. Customers could then choose among the menu selections.[50]

Administratively, the tariff approach would be more costly, but it would invariably afford a more customized approach for customers. It would also enable customers to better reveal to the LDC their ability and willingness to spend money on risk-management services. If the LDC decides to provide risk management at the pass-through level, that poses the question of how much the LDC should spend on risk-management services on behalf of its customers. Of course, the answer largely depends on the magnitude of the expected benefits consumers would derive from risk management, which is almost impossible to measure. Such a strategy encompasses both the purchase of physical gas and price-risk management. As discussed above, hedging with financial derivatives can be used by gas utilities to protect against volatile price changes, especially sharply rising prices. In contributing to price stability, hedging can enhance consumer well-being to the extent end-use gas customers would be willing to pay something for price stability.[51] There is some evidence that they actually would, advancing the argument for hedging by gas utilities.

Rather than encouraging or ordering hedging, alternatively a commission may want to consider allowing a utility to offer a fixed-price service that could provide similar benefits to consumers, namely, stable

---

[50] The basic LDC sales service could be one that includes no hedging and, therefore, would provide gas to the customer at a price close to the prevailing index price.

[51] The willingness of gas consumers to pay a premium for protection from high prices is analogous to buyers of any commodity willing to pay a premium for a call option at a specified strike price.

gas prices. As discussed earlier, some gas utilities have already done this, with others considering it.[52] Of course, offering a fixed-price service could strongly motivate a utility to hedge. Under this strategy, consumers could enjoy stable prices with less need for regulators to know whether a utility is adequately hedging.

## Specific Questions on a Hedging Strategy

The following section identifies several key questions that state PUCs should address in evaluating an LDC's proposed risk-management or hedging program.

### Should Risk Management be Provided At All?

First, what is the need for risk-management services? Is there any evidence that shows customers are willing and able to pay for hedging service? Would certain customers be more likely to demand risk management—for example, those with large monthly volumes or those with fixed incomes?

---

[52] The New York Public Service Commission was one of the first, if not the first, commission to allow gas utilities to offer fixed-price service. See New York Public Service Commission, *In the Matter of the Commission's Request for Gas Distribution Companies to Reduce Gas Cost Volatility and Provide for Alternative Gas Purchasing Mechanisms,* Case 97-G-0600, June 5, 1998.

## Scale of the Program: Protect All Core Customers or Allow for Self-Selection?

If there is an apparent demand for hedging services, on what scale should the risk management be provided? Should the LDC provide risk management for all of its core customers? For example, the LDC could cap its pass-through price so that all of its PGA customers would be eligible to benefit from the cap. Or, should the LDC offer a menu of individual tariffs, each differing by the degree of price fixity? That way customers could, by choosing their preferred tariff, select the kind of risk management that is best for them.

## The Cost of Providing Risk Management?

If the LDC proposes to provide protection to all of its pass-through customers, then how much should be expended to provide that protection? Clearly, the size of the risk-management budget warrants close examination by the regulator. Because the cost of providing risk management is highly dependent upon the selected tools, it is virtually impossible to separate the program cost from program design and administration.

## Design of the Program: Mix of Financial Derivatives

The up-front costs of a hedging program will be highly sensitive to whether the LDC proposes to fix a price using a futures contract or cap a price using a call option. Rather than attempting to lock in a price with a futures contract, should the LDC rely on options to leave open the possibility that prices may decrease in the future? That is, should the LDC hedge so that customers retain the downside price risk and avoid the upside price risk? If so, should the LDC establish a price cap? If yes, at what level should the cap be set? Lower price caps, *ceteris paribus*, means a higher hedging cost. Should all winter volumes be capped? The more volume that is covered the greater the hedging cost.

## Specific Program Features?

If the LDC proposes to use futures to establish a fixed price, what volume of gas should it hedge? Should all winter volumes be hedged or some proportion? When should the futures hedge be put on? What volume of gas should be capped? Rather than establishing a price cap, should the LDC implement a price collar so that a range of prices is effectively locked in? If so, what should that range be? The size of the range will affect the cost of locking in the range. Besides caps and collars, a number of other risk-management strategies can be employed. Only the hedger's imagination serves as a limit.

## The LDC as Hedger: What Role Does the LDC's Price Expectations Play?

As discussed earlier, the LDC's expectation of future prices may influence its hedging decisions. If it expects prices to increase, it may prefer to hedge with futures contracts. Alternatively, if it expects prices to fall, then it may prefer to hedge with options. To the extent the LDC's expectations influence its hedging strategy, establishing the reasonableness of that strategy will require some evaluation of the LDC's expectations.

## Guidelines for Assessing Hedging Programs

In the previous section, we posed numerous questions regarding the regulatory evaluation of proposed hedging programs. It's unlikely that hedging programs will be hatched by LDCs using a cookie cutter approach. In terms of specifics, different LDC hedging programs may have less in common as opposed to more. Nevertheless, it seems reasonable that every hedging program meet certain general guidelines. We offer the following guidelines as a point of departure:

1. **Establish the need**

   Because risk management is a costly activity, having evidence that customers are willing and able to pay for that service may provide both the LDC and regulators with a picture of how large the hedging program should be, in terms of budget, and the kind of protection customers may prefer. For example, consumers may prefer "catastrophic protection," meaning protection from the chance of extreme spikes. If so, that may reveal a preference for a price cap approach (and, thus, the use of options). Furthermore, while retail residential customers may be risk averse, regulators should not simply conclude that all price volatility should be eliminated. After all, the financial integrity of the average household is not greatly influenced by its monthly gas bill.

**2. To begin with, keep hedging programs as simple as possible**

It is feasible to keep gas-procurement decisions separate from hedging-program decisions. LDCs can purchase their required gas at index and then use derivatives to hedge the risks inherent in that purchasing practice. It is probably easier and just as effective to pursue hedging-program objectives separate and distinct from the gas-procurement objectives. When hedging decisions are commingle with gas purchase decisions, as in the case of fixed-price gas contracts, it is more difficult to assess the prudence of that "bundled" decision.

**3. Articulate and specify the objectives of a hedging program**

The LDC should identify the general objectives of its hedging program. This would require an identification of the specific risks being managed, and the specific risk-management tools that will be utilized. It would also require the LDC to explain the role, if any, that its price expectations play in its proposed hedging program. An LDC that expects prices to fall may propose a limited hedging program. That could be defensible depending on the reasonableness of the LDCs expectations. By assessing the LDC's expectations, regulators can also contain possible LDC urges to speculate.[53]

---

[53] Having noted that the average residential gas customer most likely does (continued...)

4. **Identify all hedging-program costs**

   Of course all costs, potential and actual, need to identified. Recovery provisions should be clearly articulated. Customers must understand that risk-management provisions are costly. Customers should also understand that expenditures on risk management do not always produce a benefit. They may pay for risk protection that may not be needed, when all is said and done. For example, money can be spent on options that are never exercised. Or by using futures, the LDC may effectively lock in a price that turns out to be far in excess of the average market price.

5. **Identify the LDC's risk-management expertise**

   Hedging programs should be designed and operated by sufficiently qualified personnel. Managers need sufficient flexibility to make specific decisions. Regulators should resist the temptation to micro-manage the LDC's hedging program. Instead, regulators should focus their attention on the general provisions and parameters of the overall hedging program.

---

[53](...continued)
not face a significant amount of financial exposure from his monthly gas bill, it may be reasonable for LDCs to propose hedging programs with rather limited scopes. For instance, hedging some fraction of winter volumes in the neighborhood of 50 percent may be reasonable. Thus, it may be reasonable for LDCs to under-hedge, even though under-hedging can be viewed as speculative.

6. **Establish reporting requirements**

   Every hedging program should require a reporting of all risk-management activities so that regulators are fully informed of program development.

7. **Consider up-front approval of hedging-program proposals**

   The prudence of purchasing a call option should not hinge upon whether the option was exercised. The reasonableness of a hedging program should be evaluated before a program is actually implemented. If regulators decide to perform *ex post* reviews, they run the risk of creating unrealistic or inefficient performance standards, or both. The success of a risk-management program should not be evaluated strictly on how things turn out.

Whether LDCs should be encouraged to provide risk-management services, we note the following. LDCs that have pass-through provisions may have little if any direct incentive to offer a hedging program. By hedging, however, the LDC's risk from customer non-payment of bills may be reduced. There also may be other indirect pecuniary incentives. Certainly the consumer outcry heard last winter was directed largely at the LDCs. There was a sense, rightly or wrongly, that LDCs could have done more to hold down gas-price increases. If nothing else, the winter of 2000-2001 revealed that risk management is a value-added service that LDC gas customers may demand, and LDCs can provide. If in fact there is a demand for risk management by LDC customers, it may be hard to conclude that not filling that demand is in the public interest.

## The Effects of PGAs

Traditional PGAs greatly restrict the incentives of gas utilities to hedge.[54] When gas prices decline because of successful hedging, the benefits directly go to consumers; when failed hedging leads to higher gas prices, a commission may disallow some of the associated costs on grounds of management imprudence. For example, with hindsight a commission may argue that the utility should be held accountable for hedging at prices above the prevailing market or spot price.

With the prediction of little or no hedging under traditional PGAs, price risk gets shifted to consumers.[55] By using financial derivatives for hedging purposes, the utility shifts that risk instead to speculators and other third parties. Consequently, hedging eliminates or reduces any price risk to both consumers and the utility.

---

[54] PGAs have been criticized by analysts and others for weakening the incentive of a gas utility to control its purchased gas costs. Although this may be true, it would be wrong to say that a utility would have no incentive – (1) allowing gas prices to get too high may meet with political resistance, especially if prices become unaffordable to some end-use consumers, (2) lost sales could result from fuel switching and other price-elasticity effects, and (3) a cost disallowance could result from a commission determination of management imprudence.

[55] Of course, this assumes that the retail customers of gas utilities are captive, which has become less true in recent years because of the availability of customer choice programs in about half the states.

It is not altogether clear whether it is more efficient for consumers or utility shareholders to bear gas-price risks. It may be the case that consumers are more risk neutral to the extent their wealth, relative to shareholders' wealth, is less influenced by movements in gas prices

Elimination of the PGA should motivate gas utilities to hedge more.[56] The reason is that price risk would shift from consumers to utility shareholders. Utility management would in turn be expected to shift this risk or at least a portion of it, through financial derivatives, forward to other parties.

## Alternative Commission Policies

State PUCs can choose among different positions and policies with regard to utility hedging with financial instruments:

- **Utilities should not hedge.** For whatever reason, hedging with futures contracts, call options, or other financial derivatives may not be regarded as an appropriate activity for gas utilities.[57] For example a state commission may fear that (1) utilities would speculate if allowed to participate in the futures market, (2) the futures price will turn out higher than the market price, (3) utilities are not adequately skilled to hedge,[58]

[56] We are not advocating here that regulators eliminate or modify existing PGAs. Existing PGAs may have benefits that override the cost of under-hedging.

[57] This may have been the position of most state PUCs prior to the unexpected surge in gas prices during the 1996-1997 winter heating season.

[58] A gas utility could always hire an outside firm to conduct its hedging program. As one example, last year Kansas Gas Service Company hired Williams Energy Marketing and Trading Company to manage its hedging program. There may, however, be an agent-principal problem where the contractor would have interests divorced from the utility's.

or (4) the up-front hedging costs would exceed the expected benefits to consumers.

- **There is no prohibition of hedging but also no guidance given by a commission.**[59] This position would likely discourage hedging since a gas utility would not know whether the costs associated with hedging would be recovered from consumers and how the commission would retroactively view its hedging activities.
- **A gas utility can hedge but only after obtaining approval from the commission of its hedging strategy or plan.** In this case, hedging is voluntary on the part of the utility, but it must receive permission from the commission on its overall hedging program. Approval of hedging programs by the commission can signal to the utility that the associated costs would be recovered from consumers.[60]
- **A commission requires utility hedging.** A commission could find hedging in the public interest and, therefore, order an LDC to provide that service.[61] A commission would impose a

---

[59] This has been true in some states where gas utilities have been reluctant to hedge with financial instruments because of the lack of clear signals from commissions on the treatment of gains and losses.

[60] Approval of a utility's "hedging plan" may depend on the plan's basic elements, which can include trading limits, an internal oversight process, clearly articulated objectives, other safeguards, and reporting and monitoring guidelines.

[61] As an example, the Colorado Public Utilities Commission recently approved an emergency rule requiring gas utilities to mitigate natural-gas price volatility. The Commission is investigating a plan that may require gas utilities to hedge.

penalty if the LDC failed to step forward with a hedging proposal. Unless a utility directly benefits from a successful hedging plan, however, it may not try hard to successfully execute the plan, especially if it is able to pass through all gas costs, including those reflective of a "bad outcome," to consumers.

Some state commissions have articulated their views on hedging and the use of financial derivatives by gas utilities. Briefly discussed below are samples of these commissions' positions, opinions, and decisions on hedging. Incidentally, many of these actions came after the unexpected rise in gas prices during the1996-1997 winter heating season.

In a 1997 order, the Connecticut Department of Public Utility Control expressed its concern that gas utilities should give more consideration to risk-management options.[62] The utilities in the state have been discouraged from hedging because of what the utilities perceived as a non-symmetric risk-reward relationship[63]—that is, the retention of a larger proportion of hedging losses than hedging gains. Specifically, the Department ruled that the utilities would absorb 80 percent of the losses and receive only 20 percent of the gains.

The Missouri Public Service Commission has allowed gas utilities to operate pilot hedging programs for the use of futures, options, and

---

[62] Connecticut Department of Public Utility Control, *DPUC Review of the Purchased Gas Adjustment Clause*, Docket No. 96-01-28, April 23, 1997.

[63] This has been publicly acknowledged by the Department.

collars[64] for specified portions of their gas supplies.[65] The Commission requires that the utility and its customers share equally in the financial benefits and costs associated with financial instruments. The Commission also ruled that it will not make any cost disallowance, provided that the financial instruments are purchased (1) within an authorized price range mutually agreed to and approved by the Commission, and (2) at prices prevailing in the NYMEX natural gas market at the time a purchase is made. The state has recently formed a task force in part to investigate how utilities could avoid future price spikes.[66]

The Michigan Public Service Commission has labeled the NYMEX futures prices as the "best available representation" of near-term natural gas prices. In 1997, the Commission approved a financial hedging program for Michigan Consolidated Gas Company that allowed the utility to take a futures position up to $20 million.[67] The Commission allowed a 50/50 sharing of gains and losses, with the utility absorbing all losses in excess of $4 million. The Commission declared the benefits of hedging to

---

[64] A collar is a bilateral contract where the buyer is guaranteed a price below some maximum price and the seller is assured a minimum price.

[65] Missouri Public Service Commission, *Natural Gas Roundtable/Consumer Choice: Opportunities and Risks*, Kansas City, Missouri, July 7, 1998.

[66] Steve Everly, "Regulators, Utilities Look for Ways to Smooth Out Spikes in Natural-Gas Prices."

[67] Michigan Public Service Commission, *In the Matter of the Application of Michigan Consolidated Gas Company for Approval of Gas Cost Recovery Factors for Calendar Year 1994*, Case No. U-10385, February 5, 1997. In an order issued later that year (Case No. U-11145), the Commission found that price volatility during the 1996-1997 winter heating season was aggravated by the heavy reliance of the state's gas utilities on the spot market and, therefore, found it reasonable for utilities in the future to increase their reliance on fixed-price gas supplies.

include minimizing gas price volatility and, consequently, lessening the adverse effect of unanticipated increases in gas costs on consumers. The Commission argued that a utility may not be sensitive to volatile gas prices since it is already "hedged" against gas price increases by its PGA.[68]

The Iowa Utilities Board has acknowledged that hedging can be an effective mechanism for stabilizing gas prices, but strongly opposed use of the futures market by gas utilities for speculating.[69] The Board has allowed all gains and prudent costs to be flowed through a utility's PGA.

In its approval of performance incentive plans for two gas utilities, the Tennessee Regulatory Authority included as a provision in the plans:[70]

> To the extent the [Companies] use futures contracts, financial derivative products, storage swaps arrangements,[71] or other private agreements to hedge, manage or reduce gas costs, any savings or costs will

---

[68] Incidentally, the Commission identified the potential problem of gains and losses not falling within the definition of "gas costs" according to generally accepted accounting rules.

[69] Iowa Utilities Board, *Report of the Board Inquiry into Price Hedging Using Financial Derivatives*, Docket No. NOI-94-1, April 1995.

[70] The provision is contained in the section "Financial Instruments or Other Private Contracts" under each of the utility's Performance Based Ratemaking Mechanism Rider. The two utilities are United Cities Gas Company and Nashville Gas Company.

[71] Swap contracts, which are negotiated bilateral arrangements resembling forward contracts, allow a purchaser (seller) to receive payment if the price of gas falls above (below) some specified change or a market index. Swaps usually have a duration of one to twelve years. While swaps often provide a better hedge than a futures contract, they are less liquid.

flow through the commodity cost component of the Gas Procurement Incentive Mechanism.

The Wisconsin Public Service Commission has allowed gas utilities to submit a risk-management plan, with approval contingent on the inclusion of specific procedures for hedging.[72] Under this pre-approval approach, utilities presumably should feel confident that if their plans are approved, the costs associated with hedging are likely to be flowed through to consumers.

Other state commissions addressed the issue of hedging and price volatility after the 1996-1997 winter heating season. In a few instances, the commissions penalize utilities for relying excessively on the spot market and not more actively engaging in risk management. In other cases, commissions gave their approval for utilities to participate in hedging and other risk-management activities.

In a proceeding involving Indiana Gas Company, the Indiana Utility Regulatory Commission authorized the company to purchase a portion of its gas supplies under fixed-price contracts.[73] The company initially sought, and later received, Commission guidance on the prudence of the use of fixed and collared prices for gas acquisitions. The Commission expressed the position that:

---

[72] The Commission has taken a neutral position of not actively encouraging or discouraging hedging by gas utilities. It has found hedging plans to be acceptable when they contain proper limits and internal controls. It also has frown upon gas utilities speculating in the futures market (telephone conversation with Commission staff).

[73] *Re Indiana Gas Company, Inc.*, 177 PUR 4th 578 (Indiana Utility Regulatory Commission, 1997).

> Based on the evidence presented, the Commission finds the recent and anticipated gas market volatility may make the acquisition of a portion of an LDC's gas supply at fixed or collared prices a reasonable practice. [Price] diversification is one means for responding to market volatility and addressing customer interest in price stability.[74]

In a case involving Southwest Gas Corporation, the Nevada Public Utilities Commission found the company's gas purchasing strategy for the 1996-1997 winter heating season to be imprudent in failing to mitigate price risk.[75] The Commission proceeded to disallow $4.7 million of gas costs to be passed through to consumers. The Commission concluded that:

> Southwest should have been more concerned about price-risk mitigation for its customers. Southwest failed to analyze the costs of any mitigation strategies, including the use of fixed price contracts in its gas supply portfolio or the investigation of the use of financial hedging mechanisms to protect its customers from dramatic price increases over the 1996-1997 winter heating season.[76]

In another contentious case, the New Mexico Public Utility Commission found PNM Gas Services responsible for the rate shock experienced during the 1996-1997 winter heating season because of its

---

[74] Ibid., 583.

[75] *Re Southwest Gas Corporation*, 183 PUR 4th 323 (Nevada Public Utilities Commission, 1997).

[76] Ibid., 340.

almost exclusive reliance on the spot market.[77] The Commission rejected the company's claim that it had ordered the company to rely almost exclusively on the spot market or indirectly approved such reliance. The Commission rejected the company's interpretation of the "just and reasonable rates" standard to be necessarily satisfied when the company pays the market price for spot gas, for the following reasons: (1) over time, the spot price may not yield the lowest prices, and (2) volatile spot-market prices may be inconsistent with the expectations and preferences of consumers, who in most likelihood would support a balanced gas supply portfolio that manages price risk. The Commission noted that "any prohibition against hedging or otherwise stabilizing [the company's] prices is a self-imposed prohibition, not a Commission imposed prohibition." In a follow-up docket,[78] the Commission reprimanded the company for not using appropriate contracting and hedging tools to balance the goals of procurement of low-cost gas and mitigation of price volatility.

The New Jersey Board of Public Utilities has encouraged gas utilities to better manage price risk. In a docket involving Public Service Electric and Gas Company, the Board found that locked-in gas prices protect consumers against price spikes, although they may at times exceed the market price for gas.[79] In another case, Elizabethtown Gas Company agreed to consider using fixed-price contracts or financial

---

[77] *Re PNM Gas Services, A Division of Public Service Company of New Mexico*, 175 PUR 4th 393 (New Mexico Public Utility Commission, 1997).

[78] *Re PNM Gas Services, A Division of Public Service Company of New Mexico*, 188 PUR 4th 448 (New Mexico Public Utility Commission, 1998).

[79] *Re Public Service Electric and Gas Company*, 179 PUR 4th 326 (New Jersey Board of Public Utilities, 1997).

instruments to mitigate price volatility.[80] The company proposed a hedging-like program that would establish procedures and guidelines under which the company would use certain financial instruments.

In a 1997 case involving Roanoke Gas Company, the Virginia State Corporation Commission approved a one-year pilot program allowing the company to use financial instruments for hedging purposes to protect against volatile natural-gas prices during the winter heating season.[81] A Commission staff report concluded that hedging contracts can be an appropriate component of a company's gas-supply portfolio and should be considered a legitimate PGA pass-through cost. The staff recommended that the company's board of directors consider adopting a risk-management policy that specifies responsibilities, procedures, and controls.

Finally, a recent decision by the Indiana Utility Regulatory Commission reflects a commission's criticism of a gas utility for failing to adequately mitigate gas price volatility during the 2000-2001 winter heating season.[82] Specifically, the Commission reproached Indiana Gas Company for locking in the price of less gas prior to August of last year than in previous years. Accordingly, the Commission disallowed the recovery of $3,796,000 in gas costs. This amount was calculated on the

---

[80] *Re Elizabethtown Gas Company, A Division of NUI Corporation,* 187 PUR 4th 267 (New Jersey Board of Public Utilities, 1998).

[81] *Re Roanoke Gas Company,* 179 PUR 4th 364 (Virginia State Corporation Commission, 1997).

[82] Indiana Utility Regulatory Commission, *Application of Indiana Gas Company, Inc. for Approval of Changes in Its Gas Cost Adjustment in Accordance with I.C. 8-1-2-42(g) and 8-1-2-42.3*, Cause No. 37394-GCA68, January 4, 2001.

basis of the lower average price for the NYMEX futures relative to what Indiana Gas requested for recovery in its PGA.

The Indiana Commission attributed the inability of Indiana Gas to adequately lock in gas prices before August of last year to the failure of the utility's gas planning and procurement process "to address the extreme volatility and price increases present in the gas supply market."[83] In its order, the Commission noted that "Indiana Code 8-1-2-42(g)(3)(A) requires Indiana Gas to make every reasonable effort to acquire long-term natural gas supplies so as to provide gas to its retail customers at the lowest gas cost reasonably possible."[84]

The Commission identified several deficient areas in Indiana Gas' commodity planning and procurement process. Reference was also made by the Commission to the inconsistencies between the utility's recent procurement activities and those offered by the utility as prudent in 1997, when the utility requested authority from the Commission to purchase a portion of its gas supply under fixed-price contracts.[85] In sum, the Commission expressed the position that "supply diversification or a balanced portfolio approach is the most sound consumer and utility protection from unexpected price spikes." [86]

---

[83] Ibid., 11.

[84] Ibid., 3.

[85] Cause No. 37394-GCA54. See earlier discussion (*Re Indiana Gas Company, Inc.*, 177 PUR 4th 578)

[86] Ibid., 11.

# CONCLUSIONS

Because both the price level and price volatility affect consumers' well-being, hedging by a gas utility should be given serious consideration. Given the high price-volatility of gas and the consumer uncertainty that it fosters, it seems consistent with prudent management practices for gas utilities to hedge under many circumstances and to continuously evaluate hedging as part of their gas-management strategy. Even if gas prices are not expected to rise in the future, an argument can be made that hedging is still appropriate. An analogy is the decision to purchase insurance. Individuals and groups purchase insurance to protect themselves against events with catastrophic outcomes. People generally do not expect these events to occur (in the sense of "likely to occur"). For example, most people do not expect their house to burn down, yet they are willing to pay an insurance premium to protect themselves against the possibility of a fire that could diminish much of their personal wealth, no matter how remote it may be. In the same way, it can be argued that gas utilities should always hedge, as long as the possibility exists for gas prices to rise, sometimes dramatically.

On the other hand, hedging may not always be the right course of action. Particularly important is a utility's expectations of future-price trends. An LDC that expects prices to fall more rapidly than what the market expects them to fall, may be well-justified in not hedging at all or very little. This is especially true if regulators agree with that expectation.

How much gas a specific utility should hedge varies by conditions. For example, when prices are forecasted to fall, a utility may do better by purchasing more of its gas needs in the spot market. Other circumstances exist where less hedging would be appropriate and in the interest of consumers. For LDCs that do not operate under a PGA mechanism, one example is when the expected benefit of a cost-minimization strategy, which may entail heavy reliance on spot purchases, exceeds the expected benefit of price stability and stable consumer bills. According to finance theory, as a risk-management option the primary objective of hedging is to ensure that a firm has available sufficient internal cash funds to undertake value-enhancing investments.

Hedging with financial derivatives is well-developed in the natural gas arena. Hedging with gas futures contracts has advantages over other hedging alternatives, such as storage and forward contracts. Futures are highly liquid contracts with relatively low costs incurred for risk-shifting. As a caveat, hedging in the futures market should not be expected to lower the average cost of gas over time. After all, more than anything hedging represents a form of insurance against financial adversity that can result from volatile gas prices.

Under traditional PGAs, clearly gas utilities have weak incentives to hedge with financial derivatives; PGAs substitute for financial derivatives in the sense that they shift risk from the utility to someone else, namely core customers. Without a PGA, the utility would have an added incentive to shift the risk to another entity, such as speculators in the financial-derivatives market. Weak incentives for utility hedging with financial derivatives are accentuated by unclear regulatory signals with regard to: (1) the recovery of direct costs associated with hedging, and (2) the regulatory treatment of successful and unsuccessful hedging efforts.

With a perception by utilities that success will bring them no benefits and failure could bring them a penalty in the form of a cost disallowance, it is understandable why a gas utility may want to "play it safe" by steering away from financial derivatives.