Analysis of Competition in Natural Gas Storage Markets For Union Gas Limited

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EXECUTIVE SUMMARY

We (Professor Richard Schwindt, of Simon Fraser University, and Mr. Bruce Henning and Mr. Michael Sloan of EEA, Inc.) have been asked by Union Gas Limited (Union) to evaluate the nature of competition for natural gas storage services in the markets where Union competes. Our evaluation was first filed with the Ontario Energy Board in October 2004. We have updated the study to reflect natural gas price data through August 2005[1], and natural gas storage data and changes in U.S. storage regulatory policy through the end of 2005. The general conclusions of the report are unchanged in this update.

Fundamental Conclusions

1. ***We find that Union Gas storage competes within a broad regional storage market. The market structure in the competitive geographic storage region does not raise competition policy concerns under either Canadian or United States' guidelines. Moreover, because of its modest market share and the ready availability of alternatives, we find that Union Gas does not have sufficient market power to significantly influence the price of natural gas storage within the relevant geographic storage market.***

2. ***By utilizing the traditional methodology for examining market structure and finding that the level of storage concentration is moderate, our analysis supports a finding that the Board should forbear from price regulation for ex-franchise storage services.[2]***

3. ***Forbearance from rate regulation for ex-franchise storage services provides benefits to Ontario without an imposition of additional costs to ex-franchise customers. The current structure of ex-franchise natural gas storage transactions creates comparability between storage service providers competing in that market.***

However, the analysis presented here is not in and of itself sufficient to support forbearance from rate regulation for in-franchise[3] storage services. In-franchise

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1 Data on natural gas prices at different market centers were updated through August 26, 2005 and do not include the period of price volatility resulting from hurricanes Katrina and Rita.

2 For the purposes of this analysis, an ex-franchise customer is any customer outside of the Union Gas service territory, or inside of the Union Gas service territory and taking delivery of natural gas from a party other than Union Gas Limited or taking storage in excess of their seasonal load balancing requirements.

3 For the purposes of this analysis, in-franchise storage refers to bundled storage services provided by Union to customers inside their franchise service territory, and unbundled storage services provided by Union at cost-based rates to customers inside the Union Gas service territory allocated according to tariff provisions.

utility services, which are provided in conjunction with storage services, exhibit economies of scope and scale common to utilities. Forbearance for in-franchise storage services would be appropriate with a demonstration that the benefits of the competitive market exceed the costs associated with the losses in the economies of scope and scale that would likely occur if in-franchise customers were no longer supplied by a comprehensive, integrated service. Alternatively, forbearance for in-franchise storage services would be appropriate when increased election of unbundled services by in-franchise customers indicates that the economies of scale and scope inherent as part of in-franchise natural gas services are no longer important in determining customer preferences in the selection of storage services.

Methodology

In this report, we describe the methodology commonly used in Canadian competition policy to determine whether the structure, particularly seller concentration, or behavior of a market exhibits any characteristics that raise competition policy concerns. The report also shows that the Canadian competition analysis methodology is similar to that used by United States antitrust authorities and by U.S. regulators in evaluating the state of competition in natural gas storage markets in that country.

The methodology is then applied to those natural gas storage markets in which Union Gas competes with other providers of natural gas storage services and storage substitutes. At issue is whether the structure of the market for natural gas storage is consistent with a competitive result in the natural gas storage and gas commodity markets.[4]

Concentration Analysis

Based on our analysis, we find that Union Gas storage competes within an integrated geographical market for natural gas storage that includes from 1,162 to 1,759 Bcf of working gas capacity depending upon how broadly the relevant market is defined. The smaller, or core, competitive region includes:

- 152.2 Bcf of storage working gas capacity in Ontario owned by Union Gas;
- 92.4 Bcf of storage working gas capacity in Ontario owned and/or operated by Enbridge, net of any joint venture volumes with Union which are included in the Union number above;
- 627.3 Bcf of storage working gas capacity in Michigan owned by El Paso, CMS Energy, DTE Energy and others;
- 210.6 Bcf of storage working gas capacity located in Illinois and Indiana; and

[4] The structure of a market cannot guarantee a competitive result. At best it is consistent with workable competition.

- 80.3 Bcf of storage working gas capacity located downstream of Niagara owned by National Fuel Gas.

This "core competition region" is narrowly defined, and does not include several major downstream storage providers that serve Northeastern U.S. storage markets also served by Union Gas. A competitive analysis based solely on these alternatives to Union Gas storage is extremely conservative and understates the competitive options to customers of storage service at Dawn. Including a larger downstream competitive region adds an additional 596.3 Bcf of storage working gas capacity, primarily held by Dominion Transmission and Columbia Gas Transmission, to the storage capacity that competes with Union.

Additional Competitive Alternatives

Union Gas storage also competes with a variety of other alternatives than can serve the same purposes as natural gas storage. These include financial alternatives to storage, pipeline alternatives to physical storage capacity, and LNG peak shaving facilities. We have not included a quantitative analysis of these financial and physical alternatives to natural gas storage. Inclusion of these substitutes in the relevant market would further reduce Union Gas' share of the storage market and would reduce the overall level of concentration.

Competitive Finding

We find that the market structure in the core competition region does not raise competition policy concerns under either Canadian or United States' guidelines. Specifically, moderate levels of seller concentration and potential market entry suggest a competitive structure and the absence of market power. Moreover, because of its modest market share and the ready availability of alternatives, we find that Union Gas does not have sufficient market power to significantly influence the price of natural gas storage within its geographic market. This conclusion holds true for both the core competitive region defined above as well as for the more broadly defined relevant geographic market.

If Union Gas is to attract customers to the Union Gas storage located at Dawn, Union must provide services that enable these customers to lower their overall natural gas costs relative to the next best alternative. Hence, Union Gas can charge no more than the prevailing market price for storage alternatives with the same value as provided by Union Gas storage.

By utilizing the traditional methodology for the examining market structure and finding that the market for storage is relatively unconcentrated, the analysis supports a finding that the Board should forbear from price regulation for *ex-franchise* storage

services. Such a finding would be consistent with the November 18, 2004 submission to the Ontario Energy Board by the Commissioner of Competition, which stated:

> Open, competitive markets provide the most generally effective means to promote the efficient, innovative and low cost supply of products. The Bureau accordingly supports their establishment except where it can be demonstrated that such markets are not feasible or that the costs of establishing them would outweigh their benefits. [5]

The comments go on to present the steps for analysis of where competitive markets should be established.

> In a network industry such as natural gas, determining where competitive markets should be established entails unbundling the services of the incumbent utility and eliminating regulatory entry barriers into the potentially competitive functions, while maintaining regulatory control of the monopoly functions. The key first step is identifying the functions that must be performed for natural gas delivery. These functions must then be assessed to determine whether each of the unbundled functions should be governed by regulation or whether competition is preferable.[6]

The Commissioner of Competition's submission identified the appropriate standard for analysis of regulation with the statement that "open and competitive markets should be established except where it can be demonstrated that such markets are not feasible or that the costs of establishing them would outweigh their benefits," In the case of *ex-franchise* storage services, there are effectively no additional costs or losses of economies of scope or scale to "outweigh" the benefits of competition. Granting rate forbearance in order to foster an open and competitive market for *ex-franchise* storage services would not require any new systems, any change in gas pipeline business practices or any changes in Federal pipeline regulations in Canada or the United States. Current open access frameworks in Canada and the United States are sufficient to assure that deregulated Union Gas storage services would be available on a non-discriminatory basis. Indeed the only real change would be a reduction in the costs of regulatory oversight of *ex-franchise* storage contracts and transactions.

Benefits to Ontario

There are real and substantial benefits to Union customers and Ontario from a more market responsive *ex-franchise* storage market. While we have not prepared a quantitative forecast of the likely impacts on storage investment of a change to regulatory framework based on forbearance, the U.S. experience strongly suggests that regulatory

[5] Final Submission of Commission of Competition, NFG, P. 4
[6] Ibid.

forbearance[7] for storage capacity will lead to increased efficiency of storage use, and to additional investment in storage capacity in Ontario.

Improving the economic efficiency in the broader natural gas market by increased investment in storage provides direct and indirect benefits to Union Gas Customers. Current price behavior at Dawn and throughout Ontario results from market events well beyond the borders of the Province. Increases in natural gas demand for power generation in New England or New York can create "demand pull" at Dawn resulting in increased price pressure in Ontario that affects Union system gas supplies as well as gas prices for third party providers. Similarly, a cold weather system that increases Ontario heating requirements will almost inevitably increase gas requirements in the Midwest and Northeast United States. When this occurs, gas prices throughout the entire region react to the increases in demand.

Granting forbearance from rate regulation while allowing the retention of earnings from the sale of ex-franchise services increases the incentive for Union and other storage providers to invest new capital into storage. Increasing the total amount of storage capacity and deliverability can dilute some of the effects of fluctuations in gas demand and thereby mute the severity of gas price volatility compared to the volatility that would exist in the absence of the additional storage. As a result, Union Gas customers benefit indirectly in terms of reduced volatility from the development of storage when Union or other storage providers add storage to meet *ex-franchise* requirements.

The benefits that arise from additions to storage capacity to Union Gas customers and Ontario are not limited to the impacts on gas prices. When Union Gas competes successfully to provide storage services to other regulated or unregulated companies in Ontario, the market is indicating that Union Gas is in the best position to meet Ontario requirements in the most economic fashion. The result of these "arms-length" transactions provides Ontario consumers with the lowest cost service available.

Beyond these economic benefits, there are other benefits that are created through increased investment by Union and other storage providers that could result from rate forbearance in the ex-franchise storage market. As discussed previously, storage provides important operational and reliability benefits. Importantly, these benefits are greatest in the immediate proximity to the storage facility and decrease as the distance from the storage facility increases. As a result, Ontario and Ontario customers receive more reliability and operational benefit from storage to meet Northeast U.S. requirements if the storage is built in Ontario than if the storage is located in New York, Pennsylvania, or any other location. In other words, even though Ontario customers pay nothing for a contract between Union and a gas shipper in the Northeast U.S., the Ontario gas customers get the benefits of the operational advantages created by more storage in Ontario.

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[7] Regulatory terminology for "forbearance" is different in the U.S. and Canada. In the U.S., approval of market based rates by the FERC grants full regulatory forbearance on both rates and cost recovery.

In addition, Ontario receives economic benefits by providing services to other Provinces and to the U.S. When Union Gas sells storage to gas shippers in the U.S., economic activity in the Province and Canada is increased. In these instances, Ontario and Canada capture an additional element of the natural gas value chain.

The analysis contained in this report is not sufficient to support a finding that the Board should forbear from price regulation for in-franchise storage services.

Our conclusions apply to the supply of natural gas storage to ex-franchise customers. Without considerably more analysis it is not possible to conclude that market-based rates should also be applied to storage dedicated to serve in-franchise customers. While we are reasonably confident that absent regulation in-franchise customers, or their agents, would find an abundance of competitive alternatives to Union Gas storage, we are not confident that the benefits would outweigh the costs of such a policy change. *In-franchise* utility services, which are provided in conjunction with storage services, exhibit economies of scope and scale common to utilities. A finding that it is appropriate to forbear from regulation of in-franchise storage would necessitate an increase in the election of unbundled storage services by in-franchise customers. The lack of a substantial market share for unbundled storage services indicates that current customers prefer the bundled service, which captures the economies of scale and scope common to utility delivery services. Termination of the bundled services could raise the total costs of serving in-franchise customers. Without a detailed analysis of the potential impact on costs we are unable to opine on the desirability of applying market-based rates to in-franchise storage.

I. INTRODUCTION

We (Professor Richard Schwindt, of Simon Fraser University, and Mr. Bruce Henning and Mr. Michael Sloan of EEA, Inc.) have been asked by Union Gas Limited (Union) to evaluate the nature of competition for natural gas storage services in the markets where Union competes. Our evaluation was first filed with the Ontario Energy Board in October 2004. We have updated the study to reflect natural gas price data through August 2005[8], and natural gas storage data and changes in U.S. storage regulatory policy through the end of 2005.

In Section 2 of this report, we describe the methodology commonly used in Canadian competition policy to determine whether the structure, particularly seller concentration, or behavior of a market exhibits any characteristics that justify competition policy concerns. We also review U.S. experience with competitive storage markets and show that the Canadian competition analysis methodology is similar to that used by United States antitrust authorities and by U.S. regulators in evaluating the state of competition in natural gas storage markets in that country.

We then apply this methodology to those natural gas storage markets in which Union Gas competes with other providers of natural gas storage services and storage substitutes. Our analysis is presented in Section 3 of this report. At issue is whether the structure of the market for natural gas storage is consistent with a competitive result in the natural gas storage and gas commodity markets. This section includes a review of Union Gas storage operations, and then defines the product market and geographic region in which Union Gas storage services compete. This section also includes an assessment of the storage market concentration as well as an evaluation of potential barriers to entry that might limit storage competition. The final section of our report summarizes the basic conclusions of our analysis and discusses the benefits of a competitive storage market for Ontario.

II. METHODOLOGY

Canadian competition policy authorities routinely evaluate the state of competition in specific markets. This is especially true with respect to merger inquiries where the Competition Bureau undertakes to determine whether a given amalgamation will likely have anti-competitive effects. The Competition Bureau asks whether as a result of the merger, the merged entity would be able to unilaterally or interdependently exert market power. In effect, the existence of market power reflects the absence of competition in that the firm or firms exerting the market power can profitably influence

[8] Data on natural gas prices at different market centers was updated through August 26, 2005 and does not include the period of price volatility resulting from hurricanes Katrina and Rita.

prices (i.e., raise and maintain prices above competitive levels), quality, variety, service, advertising, innovation or another dimension of competition.

A. The Determination of Market Power: Canadian Competition Policy

The methodology used by the Competition Bureau to identify the likely existence of market power is most fully developed in merger policy and has been described in detail in the *Merger Enforcement Guidelines* (hereinafter, the MEGs).[9] The analysis begins with the identification of the relevant product and geographic market. This is followed by a review of the structural characteristics of the market with particular emphasis on seller concentration and barriers to market entry and exit. In addition, other factors such as the rate of innovation, market transparency, and the value and frequency of transactions are considered when relevant.[10]

1. Identification of the Relevant Product Market

The first step in determining the state of competition in a market is to define the relevant product market. This involves the identification of products (or services) that are close substitutes for the product or service being examined.

When reliable data are available and permit econometric estimation, economists evaluate the availability and nature of substitution among products with reference to the "own-price" and "cross-price" elasticities of demand estimated for each product. In particular, if the own-price elasticity of demand for a product is relatively high, it suggests the existence of good substitutes for that product. Cross-price elasticities directly report the sensitivity of the quantity demanded of a product to price changes of other products. Positively signed and relatively high cross-price elasticity coefficients therefore identify specific products that are relatively good substitutes for the product in question. Unfortunately, direct evidence in the form of statistical estimates of own-price and cross-price elasticities is rarely available.

Given the difficulties in calculating own-price and cross-price elasticities, economists also consider "pragmatic" evidence drawn from industry experts, consumer surveys and supplier behavior including company documents attesting to the relevance of competition from suppliers of other products. In fact, the MEGs set out such a pragmatic evaluative criteria for identifying close substitutes.[11]

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9 Competition Bureau, *Merger Enforcement Guidelines*, (Ottawa: Ministry of Supply and Services Canada, 2004).

10 It is generally held that that market power is less sustainable in an environment of rapid technological change, and that the interdependent exercise of market power is affected by market transparency and the value and frequency of transactions.

11 MEGs, p. 10-14.

a. End use

The substitutability of two products depends heavily upon the degree to which they are functionally interchangeable in end use. In fact, generally products must be able to serve the same end use in order to be considered substitutes. However, this does not mean that they must have similar physical characteristics. A classic example involves matches and disposable lighters, two physically dissimilar products with the same end-use.

b. Views, strategies, behavior and identity of buyers

The views, strategies and behavior of buyers provide important information as to the substitutability of products. What buyers have done in the past, and what they state they are likely to do generally provide good information as to whether they view two products as being close substitutes.

c. Trade views, strategies and behavior

The views and behavior of knowledgeable third parties can assist in defining the relevant product market. For example, the views of trade associations, government reporting agencies, consultancies, market analysts and suppliers to the industry can provide very useful information.

d. Physical and technical characteristics

Notwithstanding the fact that physically dissimilar products can be good substitutes, it is true that products sharing physical and technical characteristics are usually more likely to be good substitutes. In defining physical and technical characteristics all dimensions of the product bundle (e.g., size, shape, composition, warranty, reliability, etc.) are considered.

e. Switching costs

Buyers are more likely to view products as close substitutes the lower is the cost of switching from one to another. In some cases switching costs (e.g., the costs of learning how to use the product, costs of reconfiguring a production process or packaging costs) can be very significant relative to the price of the product. For example, the costs of switching word processing software (i.e., training staff) probably significantly exceed the cost of the software itself. Generally, the higher the costs of switching from product "A" to "B", the less likely that "A" and "B" can be viewed as close substitutes.

f. Price relationships and relative price levels

Products are more likely to be good substitutes the closer are their quality adjusted price levels and the more highly correlated are movement in their prices. Economists expect the prices of substitutes to change in a parallel fashion (e.g., if the price of "A" falls because of a shift in demand, the demand for a close substitute should move in the same direction). However, parallel price movements can be attributable to other factors (e.g., changes in the price of a common input such as energy) and therefore the price correlation is viewed as a necessary – but not sufficient – condition indicating that products are substitutes.

g. Cost of adapting or constructing production processes, distribution and marketing

Finally, in identifying suppliers of the relevant product, some attention is paid to suppliers who are "almost" in the market. For example, a supplier might not currently be producing the product in question but could modify extant facilities to do so. If the modification could be done at low costs and in a timely fashion, the supplier might be viewed as in the relevant product market.[12]

2. Identification of the Relevant Geographical Market

Identification of the geographical market involves ascertaining whether physically distant suppliers are viewed as competing with local providers. Again, price elasticities would be helpful in determining the geographic extent of the market, but they are rarely available. As with the product market, economists and antitrust authorities use pragmatic tests to define the market's physical boundaries.

The MEGs suggest applying many of the same criteria used in defining the product market to identification of the geographical market (e.g., buyers' views, trade views, switching costs and price relationships). To these, several other criteria are added.

a. Transportation costs

Transportation costs usually play a critical role in defining the extent of the market. Generally, the geographical market is large for products with high value-to-weight ratios (e.g., diamonds), and narrow for products with low value-to-weight ratios (e.g., gravel). In many cases the costs of shipping the product from a distant supplier sets a limit to the pricing influence of the local supplier. Other factors such as fragility and perishability would play a role in transportation costs.

[12] The role of barriers to entry and potential entry is discussed presently.

b. Local set-up costs

In addition to moving the product to the local market, the distant supplier might incur local set-up costs such as a warehouse, a local marketing group, or a local distribution system. Also, there may be costly regulatory hurdles to serving the local market such as licenses or inspections. If these costs are high, this can hamper the distant supplier.

c. Shipment patterns

A history of significant shipments between two geographic areas (i.e., from "X" to "Y" and from "Y" to "X") is generally viewed as a good indicator that the two areas are in the same market.

3. Market Shares and Concentration

Once the relevant product and geographical market has been determined, it is possible to measure the seller concentration. Concentration is a critical datum in identifying market power. Succinctly, it is very unlikely that unilateral or collective market power can be exercised in a market characterized by low levels of concentration. In its guidelines, the Competition Bureau notes that high concentration is a necessary but not sufficient condition for a finding that a merger will substantially lessen competition. The MEGs set out explicit concentration thresholds. They state that the Commissioner of Competition generally will not challenge a merger on the basis that it confers unilateral market power on the merged entity when the post-merger market share of the merged entity is less than 35 percent. Further, the Commissioner will not make a challenge on the basis of interdependent market power when the post-merger four-firm concentration ratio[13] is less than 65 percent, or where the merged entity's share is less than 10 percent.

4. Barriers to Entry

As noted above, high concentration is a necessary but not sufficient condition underlying a finding of market power. It is not sufficient because even dominant firms (i.e., those with very high market shares) cannot exercise market power if barriers to market entry are low. Indeed, when there are no entry barriers (i.e., the market is "contestable") even a monopolist's discretion over pricing would be highly constrained.

In evaluating entry barriers, economists focus on the costs that must be reasonably incurred to enter at an efficient scale and which are largely unrecoverable if

[13] The four-firm concentration ratio is the sum of the market shares of the four largest firms in the relevant market.

entry fails. That is, they focus on sunk costs. In some cases, barriers to entry may seemingly have little to do with sunk costs. Government imposed regulations which limit entry into an industry would be an example. Similarly, the monopolization of a critical input by an incumbent firm might be seen as an absolute barrier to entry; however, one can again say that with a sufficient investment of money, a would-be entrant could discover a substitute for that input or find alternative sources of conventional supply. The unrecoverable costs, however, might not be justified by the prospective returns.

5. Summary

To identify potential anti-competitive effects of a proposed merger, Canadian competition policy authorities undertake an analysis to determine whether the combination likely will result in the creation or accretion of unilateral or interdependent market power. The market power analysis proceeds by first identifying the relevant product and geographical markets and then calculating firm and market levels of concentration. If the merged entity would hold a market share of less than 35 percent, the authorities accept that it unlikely would be able to exercise unilateral market power. If the merger resulted in overall four-firm concentration of less than 65 percent, the exercise of interdependent market power is deemed unlikely. Authorities recognize that even with high concentration levels, other factors, particularly ease of entry, can mitigate competition policy concerns, and they consider these factors.

B. Determination of Market Power in Natural Gas Storage: The U.S. Experience

Deregulation of the U.S. natural gas industry began in the late 1970s with the partial decontrol of wellhead gas prices.[14] Over the next 15 years the U.S. Federal Energy Regulatory Commission (FERC), which has jurisdiction over interstate gas commerce, issued a number of orders that effectively deregulated all wellhead gas prices, opened access to the interstate pipeline and storage system and mandated the unbundling of the interstate pipeline companies' gas purchases, transportation and marketing. FERC Order 636, which was issued in April 1992 and implemented in November 1993, was intended to complete the process of restructuring the wholesale gas industry. The idea was to expose the industry to competitive forces by increasing customer choice and making the pricing of transportation and storage transparent. Two important elements of Order 636 were:

[14] The review of deregulation of the U.S. natural gas industry draws from: International Energy Agency/OECD, *Natural Gas Pricing in Competitive Markets* (Paris: International Energy Agency, 1998).

- Opening access to transportation and storage services - Pipeline companies were required to offer access to transportation and storage to all customers on a non-discriminatory basis.

- Unbundling pipeline services - In the past, pipeline companies had bundled gas supply, transportation, storage and ancillary services. Under the Order, they were obliged to unbundle these services and thereby allow customers to compare offerings between suppliers and purchase services separately from whom they wished.

With the unbundling of pipeline services came increased pressure from the pipeline companies for a relaxation of rate regulation for those services that were not supplied in a monopoly situation. This put FERC in the position of determining when sufficient competition for the services existed to justify market-based (as opposed to regulated) pricing[15]. In order to give those applying for market-based rates direction as to how the application would be evaluated, FERC set out policy guidelines.

1. Federal Energy Regulatory Commission Policy

FERC reviewed a number of requests for market-based rates in the early 1990s, and in 1996 set out a formal policy in its *Statement of Policy and Request for Comments re: Alternatives to Traditional Cost-of-Service Ratemaking for Natural Gas Pipelines; Regulation of Negotiated Transportation Services of Natural Gas Pipelines* (hereafter, FERC Policy).[16] In effect, the Commission allowed that in the absence of market power, market-based rates were a viable alternative to cost-of-service rates, and no review of cost of service, revenue requirements, or rate of return would be conducted.

> The Commission has determined that where a natural gas company can establish that it lacks significant market power, market-based rates are

[15] The terminology used in the regulation of rates for natural gas transportation and storage is somewhat different in the United States than it is in Canada. In the United States, "a market-based rate" refers to a condition where regulatory forbearance has been granted, and neither rates nor returns to shareholders are subject to review by the FERC. In contrast, in Canada "a market-based rate" allows the buyer and seller to negotiate a rate so long as it falls between a minimum rate and a maximum rate that is approved by the regulators, while returns to shareholders may remain regulated based on the cost of service. Moreover, unlike Canada, which generally prohibits the discounting of firm service pipeline transportation rates, FERC encourages pipelines and storage companies to discount firm service to meet market conditions. As a result, in the U.S. shippers are often able to negotiate a rate that falls between the FERC approved cost-based maximum and minimum rates, without requiring FERC approval of a "market-based rate." These discounted rates are set by market conditions and subject to market competition, although the negotiated rate cannot exceed the cost-based maximum recourse rate, regardless of market conditions.

[16] 74 FERC 61,076.

> a viable option for achieving the flexibility and added efficiency required by the current market place.[17]

The Commission went on to define market power "as the ability of a pipeline to profitably maintain prices above competitive levels for a significant period of time."[18] There are two key elements to this definition: the extent to which prices are above the competitive level and the duration of the time period. Later in the document, the Commission clarified the extent of the price elevation stating that it "believes that if a company can sustain an increase in its rates in the order of 10 percent or more without losing significant market share, the company is in a position to exercise market power to the detriment of the public interest."[19] However, individuals are not precluded from making an argument for either a higher or lower threshold in any particular case. The Commission did not explicitly define "a significant period of time." It recognized that in U.S. antitrust contexts, one year is commonly viewed as the relevant time period, but stated that this might be inappropriate in the gas industry.[20]

The FERC Policy set out the methodology for determining the existence of market power. The analysis involves three steps. First the relevant market is defined. Second, the firm's market share and market concentration are measured. Third, other relevant factors (primarily the condition of entry) are evaluated.

a. Defining the relevant market

In the usual way, the relevant market is defined along product and geographical dimensions. The applicant's services, together with other services that are good alternatives, constitute the relevant product market. The other services must be "adequate" substitutes in terms of quality, price and availability. With respect to the geographical market, the Commission looks to identify all the sellers of the product or service. "The collection of alternative sellers and the applicant constitutes the relevant geographic market."[21]

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17 74 FERC 61,076, p. 8-9.

18 74 FERC 61,076, p. 21.

19 74 FERC 61,076, p. 25-26.

20 74 FERC 61,076, p. 23-24.

21 74 FERC 61,076, p 28. The FERC Policy set out more detailed guidance as to how it would evaluate the relevant geographical market with respect to pipeline services, but did not do so with respect to natural gas storage.

b. Market share and concentration

The Commission recognized that a seller could exercise market power by acting alone (unilateral market power) or acting together with other sellers (interdependent market power). The FERC Policy did not set out a "rigid bright-line threshold level" of concentration below which a supplier is assumed to not have, and above which it is assumed to have market power.[22] Rather, it stated that if the market was characterized by a Herfindahl-Hirshman index value (a measure of concentration) below 0.18 the applicant for market-based rates would be subject to less scrutiny than if the index was above this level.[23]

c. Other competitive factors

The Commission acknowledged that even when a supplier has a large market share in a concentrated market this does not necessarily imply the existence of market power. If barriers to market entry are not significant, an attempt by the incumbent(s) to raise price above the competitive level would attract entry that would, in turn, frustrate the attempted price increase. The FERC policy notes that barriers are likely to be low when entry does not require large sunk costs of major construction. Other competitive factors to be considered include the presence of buyer power and initiatives taken by the applicant to mitigate market power (e.g., open interconnection to its facilities).

d. Summary

The analysis used by the U.S. Federal Energy Regulatory Commission to determine the existence of market power is very similar to that used by the Canadian Competition Bureau in its analysis of potentially anti-competitive mergers.

2. Application of the Policy

Since the issuance of FERC Order 636 there have been a number of successful applications for market-based storage rates. A listing is provided in Table 1. Successful applications involve storage pools in natural gas producing areas (noted in Table 1 as Type "P") and in consuming or market areas (noted as "M"). Interestingly, there are many examples of successful applications for market-based rates in the Northeast U.S. and Michigan area that are in proximity to Union Gas storage.

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22 74 FERC 61,076, p. 36.

23 The Herfindahl-Hirshman Index (HHI) = $\Sigma(s_i)^2$ where s_i is the market share, as a fraction, of the i^{th} firm. The HHI takes a maximum value of "1" in the case of monopoly (the market share of the single firm is 100% or "1", and $1^2 = 1$), and takes a very small value when the market is characterized by a large number of firms with similar market shares. For reporting purposes, the HHI is often calculated using percentage terms rather than decimal terms, resulting in a range from 0 to 10,000 rather than from 0 to 1.0. For example, $50\%^2 = 2{,}500$, while $0.5^2 = 0.25$. We have not adopted this convention for this report.

Table 1
Successful Applications for Market-based Storage Rates

Michigan and Northeast U.S. Market-Area Storage Applicants	*Year*	*Type**
WPS-ESI Gas Storage (Kimball 27)	2004	M
Wyckoff Gas Storage Company	2003	M
Seneca Lake Storage, Inc.	2002	M
Central New York Oil and Gas Co. (Stagecoach)	2001	M
Honeoye Storage Corporation, (Honeoye)	2000	M
NE Hub Partners, L.P., (NE Hub)	1998	M
New York State Electric & Gas Corporation	1997	M
Steuben Gas Storage Company, (Steuben)	1996	M
Avoca Natural Gas Storage, (Avoca)	1994	M

Other Storage Area Applicants	*Year*	*Type**
Liberty Gas Storage	2005	P
Starks Gas Storage	2005	P
Caledonia Energy Partners	2005	P
Freebird Gas Storage	2005	P
Katy Storage and Transportation	2004	P
Unocal Keystone Gas Storage LLC,	2004	P
SG Resources Mississippi	2002	P
ONEOK Gas Storage	2000	P
LBU Joint Venture	1999	P
Central Oklahoma Oil & Gas Corp.	1997	P
Moss Bluff Hub Partners	1997	P
Manchester Pipeline Corp.	1996	P
Equitable Storage Company	1996	P
Egan Hub Partners	1996	P
Enron Storage Company	1995	P
Koch Gateway Pipeline Co.	1994	P
Bay City Gas Storage	1994	P
Ouachita River Gas Storage Co.	1994	P
Petal Gas Storage	1993	P
Transok, Inc.	1993	P
Richfield Gas Storage System	1992	P

* M = Gas Consuming or Market Area Storage
* P = Gas Producing Area Storage

While we have not undertaken a comprehensive review of all FERC decisions regarding market-based pricing for storage facilities, we have identified several common themes.

First, FERC has defined relevant markets very narrowly. In an earlier study the U.S. Energy Information Administration found that:

> Thus far, in its review of market-based rate applications, FERC has defined a facility's market as narrowly as possible, both from a geographic standpoint as well as from the standpoint of which products/services are alternatives to the applicant's. FERC's reasoning is that if it can be shown that the applicant cannot wield market power in a narrowly defined market, then it certainly will not have market power in broader markets.[24]

This persists to this day. FERC defines the relevant product market as physical natural gas storage capacity.[25] The geographic market is generally limited to other storage facilities that are accessible to users of the applicant's facilities with relatively few pipeline interconnections.[26] However, FERC is currently considering a shift toward a broader definition of relevant markets in order to "facilitate the development of new natural gas storage capacity while protecting customers."[27] (See section II.B.3).

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[24] U.S. Energy Information Administration, *The Value of Underground Storage in Today's Natural Gas Industry*, March 1995, p. 35 (available at: http://eia.doe.gov).

[25] As will be discussed presently, physical storage is used to manage the risk of gas price volatility, a function that is fulfilled by a myriad of financial instruments (e.g., future contracts). Applicants for market-based rates have argued that these instruments form part of the product market before FERC (see the testimony of George R. Hall on behalf of Egan Hub Partners). Nonetheless, FERC has limited its definition to physical storage even though they acknowledge that the services provided by physical storage capacity can also be provided by other alternatives.

[26] For example, in the (2001) application for market-based rates put forward by Central New York Oil and Gas Company (CNYOG) for the Stagecoach Storage Project located in South Central New York State the applicant's expert, Thomas R. Hughes, considered three geographical market definitions. He stated that in theory all storage facilities in the lower 48 states and parts of Canada might be considered in the relevant market because pipeline interconnections constituted a North American pipeline grid system. Using a more conservative approach he found that the narrowest definition that was realistically possible included fields in Pennsylvania, New York, Maryland, West Virginia and Ohio. He also included concentration data for pools in Pennsylvania and New York alone. Without accepting any of these definitions as correct, FERC found that CNYOG's share was sufficiently small within Pennsylvania and New York as to mitigate market power concerns. (See the Market Power Analysis of Central New York Oil and Gas Company, LLC's Stagecoach Storage Project, prepared by Thomas Hughes & Associates, November 1999, found as Exhibit Z in the CNYOG application, and 94 FERC 61,194 [2001]).

[27] FERC Docket Nos. RM05-23-000 and AD04-11-000 Rate Regulation of Certain Underground Storage Facilities, December 22, 2005, p. 1.

Second, given the somewhat simplistic definition of the relevant market as physical storage, the focus of the analysis has been on the geographical market, and this analysis, generally, has been fairly basic. For the most part, successful applicants identify other storage pools that have fairly direct pipeline links to the applicant's pool and include them in the relevant geographical market. It is uncommon to find surveys of customer behavior or of trade views, or pricing analysis used to substantiate the geographical market definition.

Third, FERC has been willing to accept market-based pricing in markets with very high concentration as long as the applicant had a small market share. For example, in its 2002 decision on Seneca Lake's application it found that the HHI was above 0.2 however measured (i.e., based upon working gas capacity or deliverability) and that this was well above the 0.18 threshold for concern. Nonetheless, the application was granted in part because of Seneca Lake's relatively small share.[28]

Fourth, FERC does consider factors other than market concentration, in particular the condition of entry, when evaluating market power. One of the factors considered in approving the CNYOG application was potential expansion by competitors. FERC found that both CNG and National Fuel would be capable of expanding and increasing their available storage service, thereby providing additional alternative capacity to thwart any potential effort by CNYOG to exercise market power.[29]

FERC does not, of course, approve all applications. In 2001 the Commission rejected an application by Northwest Natural Gas Company (Northwest) for market-based rates at its Mist, Oregon storage facility. Northwest attempted to make the argument that the geographical market included storage facilities in Washington, Oregon, Utah, Nevada and the Canadian Pacific Northwest. Of the 11 storage sites included in their analysis, six were located in Canada. The Commission found this market power analysis flawed, primarily because the Canadian capacity was in a production area and was not comparable to market area storage fields such as Mist. It concluded that users of the Mist facility would not view the Canadian capacity as a reasonable alternative.

In 2003, FERC rejected an application by Red Lake Gas Storage for market based rates for a new salt cavern storage facility to be constructed in Mohave County, Arizona. FERC found that Red Lake would have power in the relevant market. In addition, the commission found that the market power analysis was flawed since it included an overly broad geographic market. The commission found that four storage facilities in the HHI

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[28] 98 FERC 61, 163 (2002)

[29] 94 FERC 61,194 (2001), p. 24. Also so ONEOK Gas Storage, 90 FERC 61, 283 (2000), where the Commission relied upon the existence of idle capacity and ease of entry for its finding of no market power concern, notwithstanding the applicant's market share of 13.5 percent.

analysis were located in gas production areas and were not good substitutes for Red Lake Storage.

The company argued that the geographic market included Texas, California, Arizona, New Mexico and Nevada. The commission concluded that due to the high cost and reliability issues associated with transporting gas between northern California and southern California-Arizona, northern California storage would not be a good substitute for Red Lake's storage service, and should not be included in the relevant geographic market. Development of the Red Lake Gas Storage facility was suspended after the FERC ruling against market based rates.

In sum, FERC has applied its market power analysis in a number of cases. Applications involving both production and market area storage have been approved. Factors other than market concentration have played a role in favourable decisions. And, when the geographical market is defined very broadly, for example to include both production and market areas, an unfavourable decision can result.

Additionally, FERC has recognized that storage markets can include cross-border capacity. FERC has accepted market-based rate applications that defined the geographical market area as including both U.S. and Canadian capacity.. For example, in approving market-based rates for the Kimball 27 gas storage field owned by WPS-ESI Gas Storage, FERC accepted a market delineation that included Michigan, Northern Indiana, Northern Illinois, Eastern Iowa, and Western Ontario, Canada.[30]

3. Proposed Changes to Current FERC Policy

In response to changes in U.S. law included in the 2005 Energy Policy Act, and to concerns related to the relatively slow development of new storage capacity in the U.S., the U.S. FERC is in the process of reviewing the process by which a storage developer may seek market based rates for new storage facilities, and has recently announced new proposed rules on market-based rates for interstate natural gas storage facilities.

The proposed rules are presented in a FERC Notice of Proposed Rulemaking (NOPR)[31] The summary from this NOPR is presented in its entirety below:

> "The Federal Energy Regulatory Commission (Commission) is proposing to amend its regulations to establish criteria for obtaining market-based rates for storage services offered under part 284. First, the Commission is proposing to modify its market-power analysis to better reflect the competitive alternatives to

[30] 108 FERC 61,061, p. 5.

[31] FERC Docket Nos. RM05-23-000 and AD04-11-000 Rate Regulation of Certain Underground Storage Facilities, December 22, 2005.

> storage. Second, pursuant to Title III, Subtitle B, section 312 of the Energy Policy Act of 2005, the Commission is proposing rules to implement new section 4(f) of the Natural Gas Act, to permit underground natural gas storage service providers that are unable to show that they lack market power to negotiate market-based rates in circumstances where market-based rates are in the public interest and necessary to encourage the construction of the storage capacity in the area needing storage services, and that customers are adequately protected. These revisions are intended to facilitate the development of new natural gas storage capacity while protecting customers."[32]

If approved, the new rules proposed by the FERC would increase the opportunities by which a storage provider can demonstrate that market-based rates would not harm consumers by expanding the definition of storage competitors to include close substitutes for gas storage services, such as available pipeline capacity and local gas production or LNG terminals. The proposed rules would apply to all storage facilities, including both new and existing storage fields. This change reflects the reality that gas in storage currently competes with these substitutes, and adopting this approach would provide a more accurate analysis of whether a storage provider can exercise significant market power in a relevant market.

The proposed rules would also provide an opportunity for the FERC to approve market-based rates for storage facilities completed after August 8, 2005 "notwithstanding the fact that the applicant is unable to demonstrate that it lacks market power" (Storage NOPR p. 22) if the Commission determines that market-based rates are in the public interest and necessary to encourage the construction of new storage capacity, and that customers are adequately protected.

III. APPLICATION TO GAS STORAGE IN ONTATIO

We turn now to an application of the analysis to that market or those markets in which Union Gas Limited provides gas storage service. The examination begins with an overview of Union Gas Limited's storage operations and then turns to an analysis of the markets in which those operations compete.

A. Overview of Union Gas Limited's Storage Operations

Union Gas owns underground storage facilities centred at Dawn with 152.2 Bcf of working gas capacity, and 2.3 Bcf/d of design day deliverability. Union's Dawn complex is the largest natural gas storage facility in Canada. The Union system forms direct

[32] FERC Docket Nos. RM05-23-000 and AD04-11-000 Rate Regulation of Certain Underground Storage Facilities, December 22, 2005. page 1.

interconnects with six pipelines, providing access to a variety of different pipelines and market areas. In addition, Union holds 1 Bcf of storage contracts with third parties and owns an LNG facility of 0.6 Bcf, giving Union total working capacity of 153.8 Bcf. For the purpose of this report, only the physical capacity/volume of 152.2 Bcf will be used.

The majority of Union Gas storage facilities are reserved to meet the needs of Union's in-franchise customer base and to maintain system integrity. Union Gas provides storage services to in-franchise customers based on cost-of-service tariffs. In-franchise customer requirements account for 75.6 Bcf of the total working gas capacity, with an additional 9.1 Bcf reserved for system operations and integrity leaving 67.3 Bcf available for Union Gas to market to third party customers.

Of the 67.3 Bcf currently available for Union Gas to market to ex-franchise and third party customers, Canadian LDCs hold 42.4 Bcf under contract. Union Gas provides an additional 22.6 Bcf of working gas capacity to other storage customers holding long term[33] storage contracts.

Union Gas provides a variety of storage services to ex-franchise customers. These services include:

- Long Term Storage: Multi-year contract for firm storage service with injections during the summer and fall, and withdrawal during the winter and spring to take advantage of seasonal price differences and to increase utilization of upstream pipeline capacity.
- Short Term Storage: Firm storage service with injections during the summer and fall, and withdrawal during the winter and spring to take advantage of seasonal price differences and to increase utilization of upstream pipeline capacity.
- Off-peak storage services: Interruptible storage service with injections and withdrawals that are primarily within the same season and do not utilize space required during the peak time frame (generally September 15 to November 15) to take advantage of short term price differences and to increase utilization of upstream pipeline capacity.
- Hub Parking: Short term interruptible storage, that allows the holder to park gas on Union's system for up to 60 days to provide flexibility.
- Hub Loans: Short term loans of natural gas to meet balancing and supply shortfall requirements.

[33] Long Term refers to contracts with an initial duration of more than one year.

B. The Relevant Product and Geographic Market

As noted earlier, the first step of a market power analysis involves the identification of products (or services) that are close substitutes for the product or service being examined.

1. Storage End Uses

Defining the relevant product market is complicated by the fact that the use of natural gas storage has changed dramatically as a result of deregulation. In the past, storage served two, relatively simple, functions. Pipelines and local distribution companies used storage to fulfill their obligations to provide a reliable supply of gas. Storage provided supply security and the ability to balance supply and demand both seasonally and in the shorter term. Because the price of gas was regulated, there was limited opportunity to arbitrage between low price and high price periods. The deregulation of gas prices significantly changed this because under the new regime there was an opportunity, indeed a commercial necessity, to profitably manage the purchase and sale of the commodity. In very simple terms, commodity price deregulation introduced variability and therefore uncertainty into commodity pricing. While storage maintains an important role in providing reliability of gas supply, storage also has come to play an increasingly important role for producers, customers and intermediaries in dealing with that price variability.

In addition, storage is an intermediate product. Storage capacity, like pipeline capacity, in and of itself has no economic value. Storage provides value only to the extent that it increases the value of the natural gas injected into storage, or increases the reliability of natural gas flowing through natural gas pipelines connected to the storage.

In the following discussion of storage end-uses we begin with the traditional functions of supply security and balancing, and then turn to its new and expanding financial role.

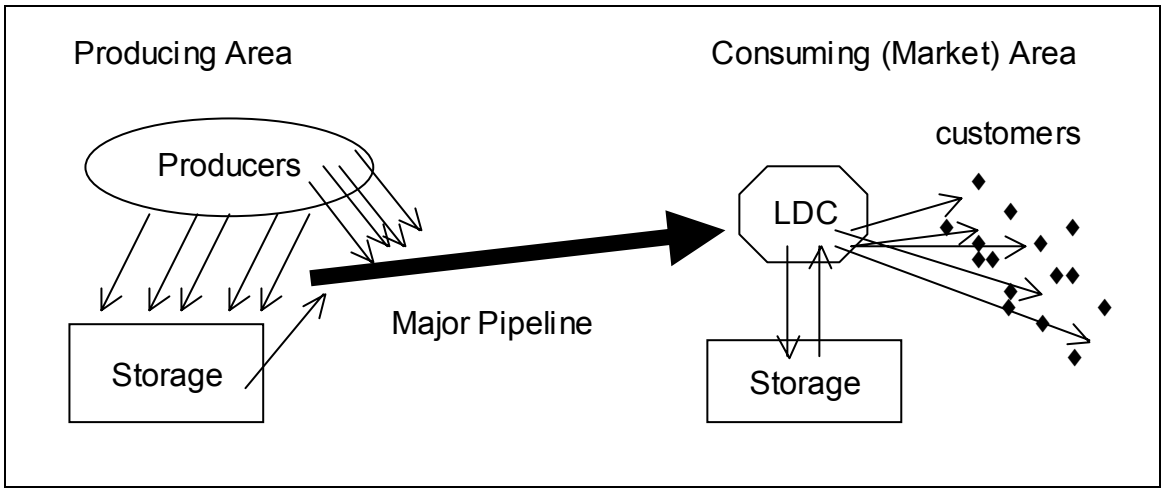
a. Security and Reliability

Figure 1 shows a stylized product flow. In this case the producing area is geographically distant from the consuming or market area. In this simplified example[34], supply to the market area would be disrupted if there were a disruption in production (e.g., frozen wells, collection system failures, or, in some regions, hurricanes) or in major pipeline service (e.g., a pipeline rupture) but for the existence of storage. Storage in the

[34] In the "real world", the disruption would result in an increase in price, creating an incentive to find other sources of natural gas, perhaps from other supply basins transported on different pipelines. The increase in price would also act to reduce demand.

producing and/or the market area could mitigate supply interruptions due to production disruptions. Market storage could mitigate supply interruptions due to either production or pipeline disruption.

Figure 1
Stylized Natural Gas Flow



There are a number of potential substitutes that can serve the security role of gas storage. First, there are alternatives to underground natural gas storage that can provide gas to be transported through the LDCs distribution system. These would include liquefied natural gas storage (LNG) and propane-air facilities. LNG facilities are an expensive storage method both to construct and to operate. The gas is liquefied by cooling and then is stored in insulated, above-ground tanks. Due to its cost, LNG storage is generally used to meet peak day demands. Stored propane can also be distributed through the local gas system in the event of disruption in the producing area or in the long-distance transportation pipeline system. Because propane has a significantly higher heat content than natural gas, it must be mixed with air before moving through the distribution system, hence the term "propane-air."

A shipper can also achieve security through pipeline access to alternative sources of supply. This option depends of course upon the availability of gas and the availability of pipeline capacity when the alternative source of supply is required. Sources of supply that are connected to a market by a relatively short pipeline route offer more security of supply than sources connected by longer pipeline routes. Sources of supply that are connected to a market by a pipeline with significant excess capacity offer more security of supply than sources connected by pipelines that are already highly utilized.

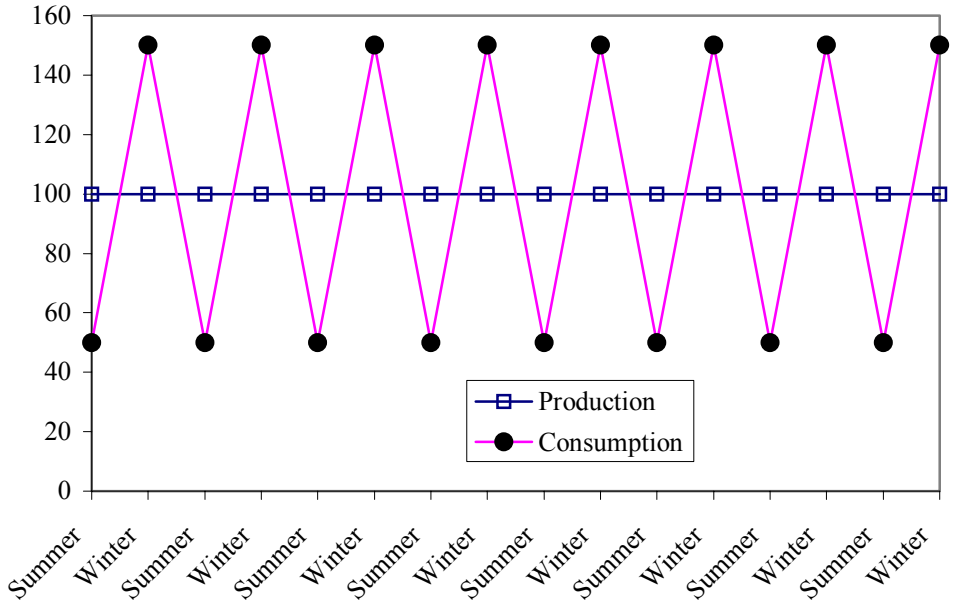
Natural gas users, primarily industrial users, can insure against supply disruption by investing in dual fuel capabilities.

b. Balancing supply with demand

In North America, the supply (production) of natural gas is relatively stable throughout the year while demand is not. The economics of production are such that initial investment costs are very high relative to marginal lifting costs (i.e., the cost of "pumping" an additional unit of gas from the well). As a result, producers cannot quickly increase production and are likely to reduce production substantially (i.e., "shut-in" a well) only when price is very low. Within a wide price band, production tends to be relatively constant over the year.

Demand on the other hand fluctuates with exogenous factors such as the weather and economic activity. Figure 2 sets out a stylized representation of production and consumption of natural gas. In simple terms production exceeds consumption in the summer, and consumption exceeds production in the winter.

Figure 2
Stylized Seasonal Production and Consumption of Natural Gas



There are several ways that peak winter demand can be met. Underground market area storage is one of them. Gas can be injected into storage facilities in the summer periods and withdrawn to meet winter demand. An obvious alternative is investment in production and pipeline capacity to meet winter requirements. However, this strategy carried to the extreme would result in substantial, costly excess capacity in the summer periods. As another alternative, customers might diversify their sources of supply, drawing from production areas in the winter that are less subject to winter peak demands.

Storage also provides a balancing function in the short-term and "very" short-term (i.e., daily and even hourly). Moreover, this type of balancing has become more important in the deregulated environment. As U.S. pipelines unbundled transportation service for the gas supply commodity, they instituted a system of fees and penalties[35] to provide shippers with the incentive to remain whole by injecting the same quantity of gas into the pipeline at the receipt point as they removed at the delivery point. In many cases, the fees or penalties have become quite large. Given that there can be unexpected fluctuations in gas demand from imprecise weather forecasts or unplanned maintenance of gas-fired equipment, economic value was created in the ability to manage these short-term imbalances. Storage can provide the flexibility to meet short-term demand shifts through short-term gas loans, and balancing and peaking services.

c. Management of price volatility and variability

Before deregulation, the price of natural gas was set and hence volatility was low. This price stability came at a cost, of course. Markets were denied the rationing function of price and the result was shortages and surpluses. Indeed, the shortages of the mid-1970s were instrumental in the initiation of the deregulation process in the late 1970s in the United States.

Under regulation, domestic petroleum, natural gas, and electricity prices were set by regulators and infrequently changed. Unfortunately, stable prices were paid for with shortages in some areas and surpluses elsewhere, and by complex cross-subsidies from areas where prices would have been lower to areas where prices would have been higher, with accompanying efficiency costs. Free markets revealed that energy prices are among the most volatile of all commodity prices.[36]

When unregulated, natural gas market prices are extremely volatile because of underlying supply and demand conditions. Supply is relatively "fixed" (i.e., inelastic) in the short to medium term as the basic supply infrastructure (wells and pipelines) cannot rapidly increase output in the face of increasing prices. Demand is also relatively price-insensitive in the short- to medium-term. With the exception of dual fuel users, most customers, particularly residential consumers, cannot substitute other products or do without in response to price increases. In addition, natural gas prices are still generally regulated at the retail level for most residential and commercial customers. Prices to these customers are adjusted over the longer term to reflect average commodity prices

[35] Currently, Union Gas does not impose these types of daily balancing fees or penalties on firm transportation and storage services.

[36] Energy Information Administration, U.S. Department of Energy, *Derivatives and Risk Management in the Petroleum, Natural Gas, and Electricity Industries*, October 2002, page ix (available at: http://eia.doe.gov).

but there is not an immediate price signal reflecting changes in market prices to these customers.

Importantly, demand fluctuates substantially seasonally, and even daily, with changes in the weather. Inelastic supply and demand, coupled with significant shifts in demand generate price volatility.

Deregulation of gas prices introduced uncertainty as to future gas prices. Both sellers and buyers now had to contend with that uncertainty. Some wished to avoid this uncertainty by "locking in" prices, while others saw this as an opportunity to profit by arbitraging between low and high price periods. Physical storage could assist with both of these activities. For example, buyers could purchase gas at a specific price, store it, and then withdraw it as needed. To them, the cost of gas was locked-in at the purchase price plus the storage cost. Those interested in arbitraging could buy when they believed prices were low, store the gas, and, if successful, sell when prices were high. However, physical storage is not required to avoid, or, symmetrically, profit from price volatility. Financial instruments, common for over a century in agricultural commodity markets, can serve the same purpose.

(i) Derivatives and "synthetic" storage

There are a large and increasing number of financial instruments that can be used to manage risk associated with future price changes. General types of financial instruments that accomplish this include forward contracts, futures, options, hedges and swaps. Every one of these instruments can be customized to the buyer's and seller's requirements or combined with other products to meet the needs of a specific customer, so the set of possibilities is nearly endless. Examples include “exchange traded” products such as NYMEX gas futures contract and options contracts, as well as “over-the-counter” products such as commodity swaps, collars, and basis swaps.

(ii) An example

Financial derivatives can compete with storage in managing seasonal price risk. Consider an end-use industrial transportation customer in Ontario that will need gas during the winter months. The customer, either directly or (more likely) through a third party marketer, has an option of buying gas in the summer and contracting for storage capacity to use the gas during the winter months. Alternatively, the customer could plan on buying gas at the prevailing market price for the winter months and purchase a futures contract that gives the customer the right to buy gas at a specific price in a specific future month, such as January. If the price for January gas in the futures market is less than the current price of gas plus the cost of storage, the customer is better off with the futures contract. If however, the futures price is above the current cost of gas plus the cost of storage, the customer is better off storing the gas.

From the perspective of a seller of storage service, the nature of this competition is important. If the storage provider attempts to raise prices for storage, the seller risks driving customers to the futures market.

d. Alternatives to Union Gas Storage

Union Gas storage is used by customers to serve all of the storage end-uses described above. Union gas storage competes with other storage and non-storage options to provide each of these services. Competitive options to Union Gas storage include:

(i) Physical Storage Within the Competitive Market Region

Union Gas storage is located in a region with substantial amounts of physical natural gas storage capacity owned by other parties, and accessible to Union Gas storage customers via existing natural gas pipeline infrastructure. To the extent that this storage capacity is within the same competitive market region as Union Gas storage, this storage capacity can compete with Union Gas storage for all end-uses served by Union Gas storage.

(ii) Physical Storage Outside of the Competitive Market Region

The North American natural gas market is generally considered to be an integrated market, and for certain end-uses, including price arbitrage and supply balancing, storage capacity throughout the North American market can serve the same role as storage services provided by Union Gas. Physical storage outside of the competitive market region would not compete with Union Gas storage for markets predicated on security of supply or load balancing requirements.

(iii) LNG and Propane Air Peaking Facilities

LNG and propane air peaking facilities owned by LDC's provide a direct substitute to underground storage for meeting low load factor peak day natural gas requirements. The availability of these facilities limits the rates that underground storage providers can charge for the same services.

(iv) Pipeline Capacity Into the Competitive Market Region

Additional pipeline capacity into the competitive market region serves as a direct alternative to Union Gas storage. Traditionally, reliability of service required purchase of firm capacity. Utilities and customers with winter reliability requirements meet these requirements with a combination of pipeline capacity and storage capacity where the amount of pipeline and storage capacity has been determined by the costs of the available alternatives. Pipeline capacity costs increase as load factor declines. As a result it is typically economic to use pipeline capacity to meet a certain amount of firm service, with

storage used to meet remaining requirements. As storage prices increase, or pipeline costs decline, pipeline capacity becomes more competitive and can be economically substituted for storage capacity.

Currently, sufficient capacity exists on most of the pipelines into the Union Gas area to result in discounting of pipeline costs for capacity on U.S. pipelines for most of the year, and increased reliability of interruptible transportation on the TransCanada PipeLine. In addition, the 200 MMcfd expansion of the Vector pipeline from near Chicago to Dawn scheduled for 2007 will further increase capacity into Dawn. As a result, pipeline capacity is able to compete with storage capacity in the current market.

(v) Open Market Natural Gas Purchases in the Competitive Market Region

One of the fundamental changes in natural gas markets resulting from the deregulation of the natural gas markets has been the development of regional natural gas market centers where customers can purchase natural gas, rather than purchasing from production regions. If customers are willing to accept the vagaries of natural gas market pricing, they can purchase gas at a variety of market centers. As a result, customers with access to a liquid market for natural gas, where gas supplies can be reliably purchased at market prices, no longer are required to hold long term pipeline capacity and storage capacity in order ensure reliable natural gas delivery. Instead, these customers can purchase daily or monthly supplies at the local market center, and allow natural gas marketers and other entities to manage the natural gas purchasing, transportation, and storage requirements needed to reliably deliver the natural gas to the market center. These customers pay a premium to encourage other companies to take the risk of managing natural gas supplies from the wellhead.

Hence, open market purchases can substitute for holding storage and pipeline capacity upstream of a liquid market center.

e. Natural Gas Storage: Summary of the Relevant End-use Product Market used in the Concentration Analysis and Summary

Market area natural gas storage serves multiple end-uses. For some uses, such as seasonal supply management and short-term natural gas price arbitrage and price hedging, there are many very good substitutes including pipeline capacity and financial derivatives. For others such as supply security, in particular insurance against disruptions of major pipeline flows, there are fewer non-storage substitutes.

In the next sections of our analysis, we define and quantify a competitive geographic market for natural gas storage. This exercise focuses on physical storage capacity. We have not attempted to quantify the impact on storage competition of the financial instruments that can substitute for storage in the roles of value maximization

and price security. We also ignore competitive pipeline capacity, even though pipeline capacity clearly provides a competitive alternative to many of the uses of physical storage capacity. Instead we focus on physical storage facilities that compete with the Union facilities at Dawn and are therefore in the relevant market. ***In so doing, we are inherently understating the degree of competition that exists in the market for storage services.***

Aside from location, gas storage operations are relatively homogeneous from the perspective of the buyer.[37] The core issue for the customer is the proximity and accessibility of the reservoir. Put differently, the geographical market boundaries are critical in defining the relevant market from a competition policy perspective.

2. Relevant Geographic Market

As noted above, identification of the geographical market involves ascertaining whether physically distant suppliers are viewed as competing with local providers. As with the product market, economists and antitrust authorities use pragmatic tests to define the market's physical boundaries. The MEGs suggest applying many of the same criteria used in defining the product market to identification of the geographical market (e.g., buyers' views, trade views, switching costs and price relationships). To these, several other criteria are added, including transportation costs and shipment patterns.

As a result, there does not exist, either in theory, or in practice a "bright line" that defines the border of a competitive market area. Instead, there exists a gradation ranging from fully competitive to fully competitive for most customers, to fully competitive for some customers, to potentially competitive for some potential customers.

We have followed a three-step analysis in order to define the relevant market area to be used in the evaluation of the level of competition in the storage markets. The first step of the analysis is an evaluation of the physical infrastructure allowing potential competition. The second step is an analysis of market pricing behavior to confirm the boundaries of the regional natural gas market. The final step covers the more qualitative evaluative criteria such as actual buyer behavior and third party views.

Based on this analysis, we have divided the competitive region into a core competitive region, which we believe represents a very conservative estimate of the

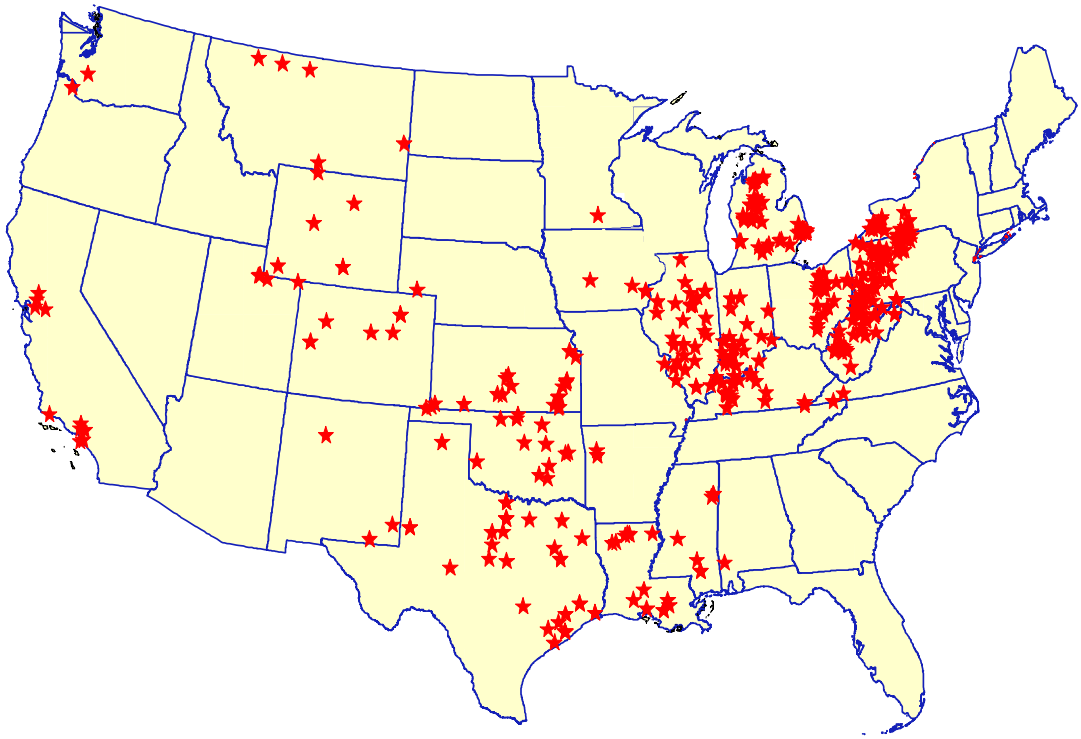
[37] This is not to say that storage facilities themselves are homogenous. For example, the industry differentiates facilities on the basis of "deliverability" which is commonly expressed as the amount of gas that can be withdrawn daily from a storage facility. High deliverability is a positive attribute and depends on the amount of gas in the reservoir, the pressure within the pool, compression capability available to the reservoir, the surface infrastructure (e.g., pipelines), and other factors. In general, deliverability is highest when the pool is full (see U.S. Energy Information Administration, *The Basics of Underground Storage*, available at: http://www.eia.doe.gov).

competitive market size. The core competitive region includes storage capacity immediately upstream and downstream of the Union Gas storage, and includes storage capacity in Illinois, Indiana, Michigan, Ontario, and New York. We have also defined a non-core competitive region, where Union competes against other storage providers for some business, but where the market for storage services may not be fully integrated. The non-core competitive region includes additional storage capacity upstream in Iowa, as well as downstream storage capacity in New York, Pennsylvania, Ohio, and West Virginia. The core and non-core competitive regions are fully defined later in this report. We believe that the most accurate delineation of the competitive market area is represented by the sum of the core and non-core competitive regions.

a. Physical infrastructure

Figure 3 illustrates the distribution of underground storage facilities in the United States. This map indicates a very large concentration of storage facilities to the Southeast and Northwest of Dawn. Canadian storage fields are concentrated around Dawn, and in the producing regions in Alberta and British Columbia.

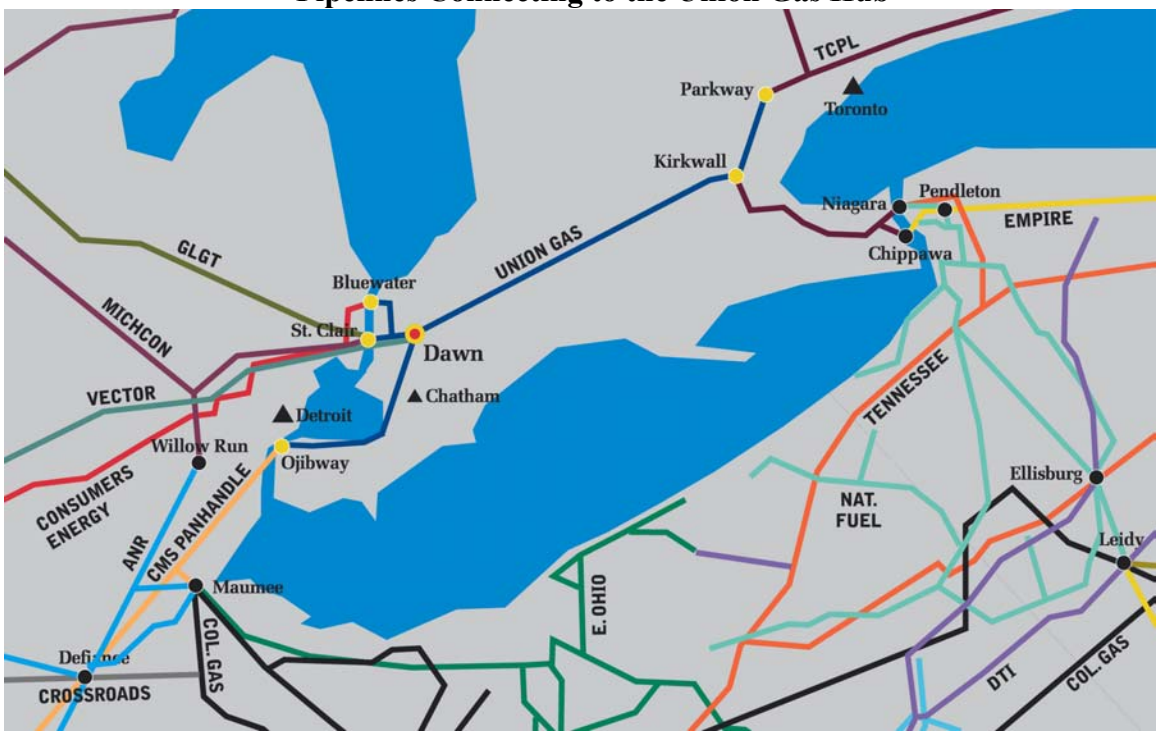
Figure 3
United States Storage Fields



Source: U.S. Energy Information Administration

Figure 4 illustrates the main pipelines connecting the storage fields in the competitive market regions around Dawn. The key direct pipeline linkages with the Union Gas storage system shown on this map are identified in Table 2. These linkages include the Vector pipeline from the Chicago area, the Great Lakes pipeline through Michigan, and the Union Trafalgar/TCPL pipelines connecting to the National Fuel Gas system in Niagara. TCPL also provides a direct pipeline link between storage in Alberta and Union Gas storage.

Figure 4
Pipelines Connecting to the Union Gas Hub



The pipeline routes linking Union Gas storage to storage in these other regions are shown in Table 3. With all of these pipeline transportation routes available, storage connected to the pipelines described can substitute for Union's storage capacity and provide economic alternatives for customer's purchasing Union storage at Dawn. This table also indicates second order pipeline interconnects with National Fuel Gas in southwestern New York and Columbia Gas in Ohio, West Virginia, and Pennsylvania, and Dominion Transmission in Pennsylvania.

EEA evaluates gas pipeline capacity and capacity utilization in great detail as part of the routine maintenance of the EEA Gas Market Data and Forecasting System[38]. In

[38] The Gas Market Data and Forecast System (GMDFS) is a proprietary computer model developed and maintained by EEA. The model is used by government, institutional, and private sector clients. The

our analysis, we find that operationally available pipeline capacity exists on all of the primary pipeline systems upstream of the Union Gas Storage in all but a very few days. This conclusion is also supported by the analysis of prices presented later in section (b). TCPL and Great Lakes have reliable excess capacity nearly all of the time. Alliance generally operates at near full capacity, and Vector often operates at near full capacity, however volumes on these pipelines can easily be shifted to either TCPL or Great Lakes, or other systems if necessary to meet flow requirements. As a result, storage that is directly tied to any of these systems can be relied on to provide storage services in the Union Gas competitive market area.

Table 2
Natural Gas Pipelines Connected with Union Gas Storage

	Location of Interconnect with Union Gas System	Connecting Pipelines	Major Upstream & Downstream Connecting Pipelines
Union Gas Storage at Dawn	Dawn	Vector TransCanada Enbridge Consumers Gas	Alliance Great Lakes CMS Panhandle Eastern ANR
	St. Clair	MichCon	Great Lakes ANR
	Bluewater	Bluewater Pipeline	ANR CMS Panhandle Eastern Great Lakes
	Ojibway	CMS Panhandle Eastern	MichCon CMS Trunkline
	Kirkwall	TransCanada	Tennessee Empire National Fuel Supply Dominion Columbia Gas
	Parkway	TransCanada Enbridge Consumers Gas	Iroquois

model was used for the 1999 National Petroleum Council study, *Natural Gas: Meeting the Challenges of the Nation's Growing Natural Gas Demand and* the INGAA Foundation study, *Pipeline and Storage Infrastructure Requirements for a 30 TCF Gas Market*.

Table 3: Major Storage Areas Connected to the Union Gas Storage System

Storage Location	Storage Operating Company	Working Gas Capacity (Bcf)	Key Pipeline Interconnects
Ontario	Enbridge	92.4	Interconnected at Dawn
Alberta	EnCana, Unocal, Enstor	210.0	TCPL to Parkway; or TCPL to Great Lakes to St. Clair, or Alliance to Vector to Dawn
Michigan	ANR Pipeline, Blue Lake and Eaton Rapids	177.6	ANR to MichCon to St. Clair
Michigan	ANR Storage	55.7	ANR to MichCon to St. Clair
Michigan	Consumers Energy	142.8	Consumers Energy to Bluewater
Michigan	MichCon	124.4	MichCon to St. Clair
Michigan	Michigan Gas Utilities	5.1	MichCon to St. Clair
Michigan	Southwest Gas Storage. / Panhandle Eastern P/L Co.	20.6	Panhandle to Ojibway
Michigan	Semco Energy Gas Co.	5.0	MichCon to St. Clair
Michigan	DTE Gas Storage Co.	74.0	MichCon to St. Clair
Illinois	Nicor Gas	144.0	Vector to Dawn
Illinois	Peoples Gas Light & Coke Co.	28.0	Vector to Dawn
Iowa/Illinois	Natural Gas Pipeline of America (Kinder Morgan)	109.6	Vector to Dawn
Indiana	Northern Indiana Public Service Co.	6.7	Vector to Dawn
Indiana	Indiana Gas Company	2.5	ANR to MichCon to St.Clair
New York	NYSG&E, CNYO&G, Honeoye, Steuben Gas Storage	28.6	Union to Kirkwall, TCPL to Niagara, NFG, Tennessee, Dominion
NY/PA	National Fuel Gas (NFG)	80.3	Union to Kirkwall, TCPL to Niagara, NFG
NY/PA	Dominion Transmission	319.5	Union to Kirkwall, TCPL to Niagara, NFG to Dominion
NY/PA/WV	Columbia Gas Transmission	245.0	Union to Kirkwall, TCPL to Niagara, NFG to Columbia

Union Gas storage also competes with storage capacity downstream of Ontario serving the Northeastern U.S. Market. This includes storage facilities in New York, Pennsylvania, Ohio, and West Virginia. The storage capacity on the National Fuel Gas Supply system in Niagara and further south is the most directly linked storage capacity in this region. Union Gas storage is competitive with these downstream storage assets as long as sufficient pipeline capacity exists to transport storage gas from Dawn to the NFG system via Niagara. Union Gas is expanding the Trafalgar pipeline system to meet customer peak day requirements including access to upstream storage capacity. The expansion will increase peak and offpeak capacity, providing additional access to storage for customers downstream of Dawn.

b. Market Pricing Behavior

In applications to FERC for market-based storage rates, economic studies intended to show an absence of market power have relied largely (some exclusively) on the type of analysis described above to define the relevant geographic market. The approach utilized in this study employs an additional analysis of market behavior to confirm the results of the analysis of the physical infrastructure to ensure that the storage included in the geographic market area can compete in the market.

In order for storage facilities to compete within the same relevant geographic market, pipeline transportation constraints must not prevent a buyer from receiving service from the other storage providers. If there are significant pipeline transportation constraints, the buyer cannot conclude that the facility can offer a service that is "an economic alternative." Our analysis of market behavior is designed to exclude any storage facilities from the relevant geographic market where transportation constraints are pervasive and limit the ability to utilize alternative storage service to meet a buyer's needs. This is accomplished by limiting the market to those facilities that exhibit closely correlated natural gas prices.

In an integrated and competitive market, we expect prices and price movements to be relatively consistent across a competitive market area, but to diverge in areas outside of the competitive market area. Hence, we have evaluated natural gas market price behavior to confirm our analysis of the competitive region for Union Gas storage services.

Approach to Price Analysis

Our review of the infrastructure links between storage facilities in the consuming area served by Dawn suggests that a number of these sites are close substitutes. We now add support for this finding by reviewing the relationship between prices and price movements at these sites and Dawn. Unfortunately, there exists no "price series" of charges for storage at these facilities. However, proxy measures are available.

The results of the price correlation analysis support and confirm the conclusions reached from the competitive infrastructure analysis as well as the review of competitive experience. Natural gas price movements in the region from Chicago and Michigan, through Dawn have been very closely correlated during most periods. Prices at Niagara have been very closely correlated during most of the historical reference period. Columbia Appalachia and Dominion Southpoint are also very closely correlated, but show more volatility than the storage regions with more direct connections to Dawn. Beyond this region, prices and price movements tend to diverge to a greater and greater degree.

As a result, the price analysis supports the conclusion that storage capacity in the region including Northern Illinois and Indiana, Michigan, Ontario, and Niagara is within the same geographic market. The price analysis also indicates that storage capacity in Pennsylvania, West Virginia and Ohio owned by Columbia Gas Transmission and Dominion Transmission is closely linked to Dawn on a seasonal basis, but may be less closely coupled on a daily basis.

In order to evaluate the market price behavior, we have looked at the natural gas prices and the natural gas transportation differential (or basis) from Dawn for a variety of different market points in the region, using daily price data reported by Platts *Gas Daily*.[39] We have evaluated the daily price basis between Dawn and the following market points:

- Henry Hub
- NOVA, AECO
- Chicago city-gates
- Consumers Energy city-gate
- MichCon city-gate
- Columbia Gas, Appalachia
- Dominion, South Point
- Niagara
- Alliance into Interstate

These points were selected to evaluate the potential competitive market area identified above based on the physical infrastructure analysis, and based on our understanding of the storage that Union Gas storage customers would consider when evaluating whether or not to contract for Union Gas storage.

[39] Gas Daily data are widely used within the gas industry in the course of business. Commodity purchase agreements often reference prices published in *Gas Daily* to determine transaction prices. In addition, pipeline tariffs often reference *Gas Daily* prices to calculate balancing fees or penalties and "cash-out" payments.

The pricing data reported by the *Gas Daily* include prices at the most widely traded market centers. While market centers such as Dawn are often associated with storage capacity, the *Gas Daily* does not report prices at all of the major storage centers. Where necessary, we have selected the nearest relevant pricing point as a proxy for the price of gas at the storage center. Hence, the price at Niagara is used as a proxy for NFS storage in western New York.

The analysis has been conducted using daily price data from 1999 through August of 2005.[40] However, the completion of the Alliance and Vector pipelines in December of 2000 fundamentally changed the relationship between Dawn and the upstream markets connected to Dawn through these pipelines. In addition, Platt's first began reporting daily prices at the Dominion Southpoint Hub in January 2000. Since care needs to be taken to evaluate data over a consistent time period, the focus of the analysis is on the time period from January 2001 through August 2005, although data for the 1999 and 2000 are also presented in order to provide a longer term perspective in certain markets.

Correlation analysis provides a commonly accepted method to evaluate the stability of price relationships. Table 4 shows the statistical correlation between the daily natural gas prices reported at Dawn, and the daily natural gas prices reported at each of the other points considered. At all of the points considered, the R-square of the correlation coefficient is very high. The correlation coefficient (r^2) is at or above .989 for the period from January 2001 through August 2005 for all of the price points included in the core market area (Niagara, Consumers Energy citygates, MichCon citygates, and Chicago citygates). For the points in the non-core market area (Dominion Southpoint, Columbia Appalachia), the correlation coefficient (r^2) during this period were above 0.985. The correlation coefficient (r^2) for Alberta, which is considered to be outside of the competitive market area, was .965.

Economists recognize that the prices (quality corrected) of substitute products should be similar and should move together over time. They also recognize that evidence that the prices of supposed substitutes move together over time is not enough to conclude that they are close substitutes.

The correlation between natural gas prices in different locations is very high, primarily due to the integrated nature of the North American market. While relevant to the analysis of storage market power, the correlation analysis tends to be dominated by the underlying trends in natural gas prices. Hence, we have conducted additional analysis of the prices to focus more closely on the market for storage. In order to exclude the impact of the underlying gas market trends that dominate the correlation analysis, we look at the difference in daily gas prices between Dawn and each of the other market

[40] The natural gas price analysis excludes data after August 26, 2005 due to the extreme volatility in general natural gas prices during the period after Hurricanes Katrina and Rita when Henry Hub and other major production area market centers were not operating.

centers in the analysis. These differences are generally referred to as the gas market transportation basis between two points.

Table 4: Natural Gas Price Correlation with Dawn

	1999-2005	2001-2005	1999	2000	2001	2002	2003	2004	2005\b
Henry Hub	0.991	0.987	0.990	0.998	0.997	0.992	0.963	0.966	0.990
Niagara	0.993	0.989	0.998	0.999	0.999	0.996	0.977	0.816	0.989
Consumers Energy, Citygate	0.998	0.997	0.993	0.999	0.999	0.998	0.994	0.989	0.997
Mich Con, Citygate	0.996	0.997	0.992	0.988	0.999	0.998	0.993	0.992	0.998
Chicago, citygates	0.991	0.995	0.982	0.978	0.999	0.996	0.986	0.979	0.991
Alliance, into Interstates	0.996	0.996			0.999	0.997	0.989	0.980	0.992
Columbia Appalachia	0.991	0.986	0.990	0.998	0.997	0.983	0.962	0.968	0.991
Dominion South Point	0.988	0.987		0.997	0.996	0.993	0.966	0.944	0.988
NOVA, AECO-C	0.975	0.965	0.966	0.987	0.996	0.885	0.887	0.952	0.988

a) Completion of Alliance/Vector in 2000 resulted in a fundamental change in price relationships between Dawn and upstream markets.
b) 2005 includes data through August

We used two measures of the differences in price behavior to identify the core competitive market area for Union Gas storage at Dawn. First, we evaluated differences in the seasonal value of storage at the different market centers. In a fully competitive market, we expect this seasonal differential to be roughly equivalent throughout the market area. Second, we compared day-to-day price volatility. We expect day-to-day price differences between points within an integrated market to be stable.

Markets for gas at the wellhead in North America are highly competitive, and gas prices are regularly reported. Prices of gas in consuming areas, primarily at competitive market hubs, are also reported. The difference between gas prices at different hubs, known as the transportation basis, reflects the implicit cost of transportation and storage. Moreover, if it is assumed that transportation (i.e., pipeline) charges do not change seasonally, then the difference between the summer and winter prices of gas at a hub (i.e., the summer-winter basis) reflects the "value" of injecting gas into storage in the summer, holding it, and then withdrawing it during the winter. That is, it reflects the implicit seasonal value of storage.

Storage at one location will compete with storage at other locations as long as transportation is readily and reliably available from both storage facilities to the end user, and the difference in the cost of transportation from the two fields to the end-user is stable. Moreover, if the value of transportation is stable over time, the cost of moving gas from one location to another will be effectively the same whether the gas is transported in the injection season or in the withdrawal season.

Table 5 summarizes the natural gas prices used to conduct the analysis. The data are presented using various time periods that reflect market conditions. Because storage

provides one approach to supplying natural gas during the winter, a seasonal comparison is particularly relevant. In each of the years examined, we have provided average prices for the period April through October, when seasonal natural gas supply is typically injected into storage to meet future winter requirements, and the period November through March, when natural gas is typically withdrawn from storage to meet seasonal demand requirements. The difference between the price of gas during the storage withdrawal season and the price of gas during the injection season is identified in this table represents a proxy for the seasonal storage value.[41]

Table 5: Average Price at Market Centers That Potentially Compete with Dawn (U.S. $/MMBtu)

	Dawn	*Henry Hub*	*Niagara*	*Consumers Energy Cityate*	*MichCon City-gate*	*Chicago Citygate*	*Alliance into Interstate*	*Columbia Gas Appalachia*	*Dominion Southpoint*	*NOVA/ AECO-C*
AVERAGE PRICE										
Overall Average										
1999-2005	4.65	4.49	4.75	4.60	4.59	4.53	5.02	4.70	5.22	3.85
Jan 2001 - Aug 2005	5.20	5.01	5.31	5.14	5.14	5.03	5.02	5.25	5.37	4.28
Winter										
Nov 1999 - Mar 2000	2.62	2.51	2.68	2.57	2.55	2.55		2.63		2.19
Nov 2000 - Mar 2001	6.95	6.73	7.05	6.88	6.64	7.04	6.43	7.01	7.17	6.22
Nov 2001 - Mar 2002	2.60	2.47	2.67	2.53	2.54	2.47	2.48	2.57	2.63	2.20
Nov 2002 - Mar 2003	5.90	5.52	6.29	5.73	5.69	5.62	5.62	5.73	6.50	4.72
Nov 2003 - Mar 2004	5.70	5.49	5.98	5.61	5.58	5.54	5.54	5.70	5.88	4.75
Nov 2004 - Mar 2005	6.67	6.41	6.82	6.55	6.56	6.44	6.45	6.71	6.77	5.61
Summer										
Apr 1999 - Oct 1999	2.51	2.43	2.54	2.50	2.51	2.48		2.57		2.11
Apr 2000 - Oct 2000	4.35	4.20	4.37	4.31	4.35	4.29		4.40	4.43	3.55
Apr 2001 - Oct 2001	3.58	3.41	3.59	3.55	3.57	3.45	3.44	3.61	3.63	2.94
Apr 2002 - Oct 2002	3.41	3.41	3.48	3.44	3.42	3.39	3.38	3.62	3.59	2.46
Apr 2003 - Oct 2003	5.42	5.17	5.46	5.36	5.41	5.22	5.22	5.42	5.53	4.49
Apr 2004 - Oct 2004	6.08	5.86	6.12	6.01	6.04	5.83	5.83	6.14	6.18	5.01
Apr 2005 - Aug 2005	7.57	7.47	7.65	7.56	7.57	7.36	7.37	7.79	7.83	6.27
Annual										
Nov 1999 - Oct 2000	3.62	3.49	3.66	3.58	3.59	3.56		3.65	3.95	2.98
Nov 2000 - Oct 2001	4.97	4.78	5.02	4.93	4.84	4.94	4.30	5.02	5.09	4.30
Nov 2001 - Oct 2002	3.08	3.02	3.15	3.07	3.06	3.02	3.01	3.19	3.19	2.36
Nov 2002 - Oct 2003	5.62	5.31	5.80	5.51	5.52	5.39	5.38	5.54	5.93	4.59
Nov 2003 - Oct 2004	5.92	5.71	6.06	5.85	5.85	5.71	5.71	5.96	6.06	4.90
Nov 2004 - Aug 2005	7.12	6.94	7.23	7.06	7.06	6.90	6.91	7.25	7.30	5.94
Seasonal (Winter - Summer) Gas Price Difference										
Average	0.85	0.77	0.99	0.78	0.71	0.83	0.55	0.76	1.12	0.85
Apr 1999 - Mar 2000	0.11	0.07	0.15	0.07	0.04	0.06		0.06		0.08
Apr 2000 - Mar 2001	2.60	2.52	2.68	2.57	2.29	2.76		2.61	2.74	2.67
Apr 2001 - Mar 2002	(0.98)	(0.94)	(0.92)	(1.02)	(1.03)	(0.97)	(0.96)	(1.04)	(1.00)	(0.74)
Apr 2002 - Mar 2003	2.49	2.11	2.81	2.29	2.27	2.22	2.23	2.11	2.91	2.26
Apr 2003 - Mar 2004	0.27	0.32	0.52	0.25	0.17	0.32	0.32	0.29	0.35	0.25
Apr 2004 - Mar 2005	0.59	0.55	0.70	0.54	0.52	0.60	0.62	0.57	0.59	0.60

Source: EEA analysis of daily price midpoints reported by Platt's Gas Daily for the referenced period.

[41] The seasonal difference in natural gas prices is generally a positive value, since winter season prices typically exceed injection season prices. However, during periods of rapid price changes, the withdrawal season price can be lower than the injection season price, leading to a negative seasonal price difference.

As noted previously, we have included statistics for natural gas prices over two sets of time periods. The first is the period from January 1999 through August 2005. The second is the period from January 2001 through August 2005.

The Alliance and Vector pipelines came on-line in December of 2000, resulting in a shift in the relationship between Dawn and the markets upstream of Dawn in the Chicago area. The impact of the completion of the Alliance and Vector pipelines was to increase the size of the relevant geographic market, allowing more market participants to compete with physical storage at Dawn as well as increasing the potential to substitute pipeline capacity for storage capacity.[42] Hence, the shorter time period, from January 2001 through August 2005 is used when evaluating the competitive market region. The longer time period is provided as an additional indicator of price behavior, but is not considered indicative of current conditions for storage options west of Dawn.

The delivered cost of natural gas to a customer includes wellhead, storage, and transportation costs. Transportation costs include the cost of delivering natural gas from the wellhead to the storage field, and from the storage field to the customer. As a result, it is not surprising that the absolute prices shown in Table 5 differ. The difference in the prices reflects the value of pipeline transportation service to move gas from one location to another. However, it is not the absolute level of natural gas prices at different locations that determine whether storage at different locations competes in the same market, but rather the sum of the transportation and storage costs.

This relationship is worth illustrating. A customer in New York State comparing Union Gas storage and storage on the National Fuel Gas (NFG) system downstream of Niagara will look at the total cost of delivered natural gas. In the Union Gas storage option, the customer will consider the cost of gas delivered into Union Gas storage, the cost of the storage itself, and the cost of transporting gas from storage over the Trafalgar system, through Niagara and to the end-user. In the NFG storage option, the customer will consider the cost of gas delivered into the NFG storage, the cost of the NFG storage, and the cost of transporting the gas from NFG storage to the end-user. Assume that storage gas originally produced in Alberta is used in both options and that the original natural gas commodity price is the same in both options. The customer will be price neutral as long as the sum of the upstream transportation cost and the downstream transportation cost in the first option is the same as the sum of the upstream transportation cost and the downstream transportation cost in the second option. Hence, the customer will be willing to pay more for natural gas to be injected into NFG storage than into Dawn storage, because the customer will pay less for transporting the gas from

[42] The completion of the two pipelines in December of 2000 also created a one-time shift in gas prices between the markets upstream and downstream of the pipelines, and influencing the seasonal storage values for these points during the April 2000 - March 2001 storage year.

NFG storage to the end-user, than he will to transport natural gas from Dawn to the end-user.

Table 6 highlights the close relationship in seasonal and annual price behavior between Dawn on the other key storage centers by showing changes in the basis between Dawn and the other storage centers for different time periods. Using data from January 1999 through August 2005, we are able to evaluate six sets of seasonal prices representing a seven-year time period. During the two year period after the Alliance and Vector pipelines were completed, the analysis of pricing data indicates a strong relationship between prices at Dawn and each of the points, with the exception of Alberta, and, to a lesser extent, Henry Hub. Price volatility in 2003 and 2004 resulted in an increase in the differential between all of the points, with the differentials to Dominion South Point and Henry Hub diverging by about $0.40 in 2003.

Construction of Table 6 is best seen by example. The basis between Dawn and Henry Hub for the period January 2001-August 2005 (the second row of the table) was calculated in the following way. As shown on Table 5 the average natural gas price at Dawn for this period was $5.20; Henry Hub was $5.01. Subtracting yields the value show in this table of $0.19. This transportation basis is the average of what a customer was willing to pay to transport gas between the Henry Hub and Dawn during this period of time.

The final seven rows of Table 6 show the differences in seasonal natural gas price spreads relative to Dawn. The positive numbers represent a value the market will pay for storage at Dawn – in lieu of paying that same "differential" in order to effect an equivalent winter service to transport that same volume from the upstream market center. Similarly, the market will pay less for storage at Dawn where there is a negative number.

We have also evaluated the relationship between day-to-day price movements at the different market centers. Day-to-day price movements provide a better measure of the short-term relationship between markets than the seasonal analysis discussed above. The day-to-day relationship in prices is examined by evaluating the variation in the daily price basis between the points.

Table 7 presents an analysis of the differences in day-to-day movement prices between key points in the analysis using the standard deviation of the basis relationships as a method of measurement. The results shown in this table indicate a very close relationship in daily price movements between Dawn, and MichCon, Consumers Energy, Chicago, and Alliance for the time period after Alliance and Vector are completed. The relationship between Dawn and Niagara was very close prior to 2003, but diverged somewhat in 2003 and 2004 before returning closer to historical levels in 2005. The relationship between daily prices at Dawn and at Columbia Appalachia, Dominion Southpoint, and Henry Hub is much weaker. As in the seasonal analysis, the relationship

between daily prices at Dawn and at Alberta is much weaker than between Dawn and the other points within the competitive region.

Table 6
Average Transportation Basis Between Market Centers
That Potentially Compete with Dawn (U.S. $/MMBtu)

	Henry Hub	*Niagara*	*Consumers Energy Cityate*	*MichCon City-gate*	*Chicago Citygate*	*Alliance into Interstate*	*Columbia Gas Appalachia*	*Dominion Southpoint*	*NOVA/ AECO-C*
AVERAGE BASIS (Dawn Price minus Market Center Price)									
Overall Average									
1999-2005	0.166	(0.091)	0.050	0.060	0.121	0.172	(0.045)		0.804
Jan 2001 - Aug 2005	0.190	(0.111)	0.058	0.060	0.168	0.172	(0.045)	(0.168)	0.919
Winter									
Nov 1999 - Mar 2000	0.112	(0.064)	0.046	0.070	0.071		(0.008)		0.429
Nov 2000 - Mar 2001	0.223	(0.103)	0.068	0.311	(0.094)	0.156	(0.056)	(0.220)	0.727
Nov 2001 - Mar 2002	0.122	(0.076)	0.065	0.056	0.123	0.117	0.026	(0.031)	0.393
Nov 2002 - Mar 2003	0.382	(0.394)	0.170	0.211	0.282	0.284	0.172	(0.599)	1.181
Nov 2003 - Mar 2004	0.209	(0.281)	0.082	0.120	0.155	0.157	(0.009)	(0.188)	0.949
Nov 2004 - Mar 2005	0.260	(0.153)	0.113	0.110	0.229	0.214	(0.042)	(0.108)	1.061
Summer									
Apr 1999 - Oct 1999	0.079	(0.024)	0.007	(0.002)	0.028		(0.058)		0.397
Apr 2000 - Oct 2000	0.142	(0.026)	0.035	(0.002)	0.059		(0.052)	(0.084)	0.792
Apr 2001 - Oct 2001	0.162	(0.016)	0.021	0.006	0.127	0.139	(0.040)	(0.054)	0.637
Apr 2002 - Oct 2002	0.006	(0.068)	(0.023)	(0.010)	0.019	0.029	(0.209)	(0.171)	0.951
Apr 2003 - Oct 2003	0.254	(0.038)	0.063	0.017	0.199	0.203	0.007	(0.110)	0.902
Apr 2004 - Oct 2004	0.219	(0.038)	0.070	0.042	0.245	0.245	(0.059)	(0.103)	1.073
Apr 2005 - Aug 2005	0.095	(0.079)	0.005	0.002	0.208	0.197	(0.226)	(0.259)	1.300
Annual									
Nov 1999 - Oct 2000	0.130	(0.042)	0.040	0.028	0.064		(0.033)		0.639
Nov 2000 - Oct 2001	0.187	(0.052)	0.040	0.132	0.036	0.144	(0.046)	(0.123)	0.674
Nov 2001 - Oct 2002	0.054	(0.071)	0.013	0.017	0.062	0.065	(0.113)	(0.114)	0.723
Nov 2002 - Oct 2003	0.306	(0.184)	0.107	0.097	0.233	0.236	0.074	(0.310)	1.017
Nov 2003 - Oct 2004	0.215	(0.139)	0.075	0.074	0.208	0.209	(0.038)	(0.138)	1.021
Nov 2004 - Aug 2005	0.177	(0.116)	0.059	0.056	0.219	0.205	(0.134)	(0.183)	1.181
Seasonal Gas Price Difference									
Average	0.074	(0.143)	0.062	0.138	0.015	0.039	0.082	(0.125)	(0.002)
Apr 1999 - Mar 2000	0.034	(0.040)	0.039	0.072	0.043		0.050		0.031
Apr 2000 - Mar 2001	0.081	(0.077)	0.033	0.313	(0.153)		(0.004)	(0.137)	(0.065)
Apr 2001 - Mar 2002	(0.040)	(0.060)	0.045	0.051	(0.004)	(0.022)	0.065	0.023	(0.244)
Apr 2002 - Mar 2003	0.376	(0.325)	0.193	0.221	0.262	0.255	0.380	(0.427)	0.230
Apr 2003 - Mar 2004	(0.045)	(0.243)	0.019	0.102	(0.044)	(0.046)	(0.016)	(0.078)	0.046
Apr 2004 - Mar 2005	0.041	(0.114)	0.043	0.068	(0.015)	(0.032)	0.017	(0.005)	(0.012)

Source: EEA analysis of daily price midpoints reported by Platt's Gas Daily for the referenced period.

There exists no "bright line" to designate the acceptable level of price differential within a competitive market region. However, a certain level of price differential is normal and expected in any real world market. In natural gas markets, a certain level of volatility in reported prices is inevitable due to minor differences in price reporting

practices at different market centers, as well as minor differences caused by fluctuations in weather, supply basin prices, pipeline outages, and other factors. As a result, setting a ceiling on price differentials allowed in a competitive market area is necessarily subjective.

Table 7:
Standard Deviation of Transportation Basis Between Market Centers That Potentially Compete with Dawn (U.S. $/MMBtu)

	Henry Hub	*Niagara*	*Consumers Energy Cityate*	*MichCon City-gate*	*Chicago Citygate*	*Alliance into Interstate*	*Columbia Gas Appalachia*	*Dominion Southpoint*	*NOVA/ AECO-C*
Standard Deviation of Basis with Dawn									
Overall Average									
1999-2005	0.27	0.25	0.13	0.19	0.27	0.19	0.26		0.49
Jan 2001 - Aug 2005	0.31	0.29	0.15	0.16	0.21	0.19	0.31	0.35	0.52
Winter									
Nov 1999 - Mar 2000	0.07	0.06	0.05	0.04	0.07		0.07		0.09
Nov 2000 - Mar 2001	0.19	0.12	0.12	0.46	0.76	0.04	0.23	0.34	0.28
Nov 2001 - Mar 2002	0.10	0.06	0.07	0.05	0.09	0.09	0.11	0.14	0.12
Nov 2002 - Mar 2003	0.91	0.60	0.41	0.46	0.56	0.52	0.87	0.94	1.42
Nov 2003 - Mar 2004	0.19	0.64	0.11	0.08	0.12	0.11	0.20	0.30	0.18
Nov 2004 - Mar 2005	0.16	0.16	0.09	0.07	0.13	0.12	0.14	0.22	0.15
Summer									
Apr 1999 - Oct 1999	0.05	0.02	0.04	0.04	0.05		0.05		0.10
Apr 2000 - Oct 2000	0.09	0.03	0.06	0.04	0.06		0.08	0.06	0.26
Apr 2001 - Oct 2001	0.09	0.03	0.04	0.03	0.06	0.06	0.08	0.07	0.12
Apr 2002 - Oct 2002	0.10	0.03	0.04	0.03	0.06	0.05	0.13	0.08	0.34
Apr 2003 - Oct 2003	0.07	0.04	0.05	0.04	0.09	0.09	0.07	0.09	0.18
Apr 2004 - Oct 2004	0.14	0.04	0.06	0.05	0.10	0.10	0.14	0.09	0.19
Apr 2005 - Aug 2005	0.15	0.03	0.06	0.04	0.13	0.13	0.15	0.14	0.19
Annual									
Nov 1999 - Oct 2000	0.08	0.05	0.06	0.05	0.07		0.08		0.28
Nov 2000 - Oct 2001	0.14	0.09	0.09	0.33	0.50	0.06	0.16	0.24	0.21
Nov 2001 - Oct 2002	0.12	0.05	0.07	0.05	0.09	0.08	0.17	0.13	0.39
Nov 2002 - Oct 2003	0.58	0.42	0.27	0.31	0.37	0.34	0.57	0.65	0.93
Nov 2003 - Oct 2004	0.16	0.43	0.08	0.07	0.12	0.11	0.17	0.21	0.19
Nov 2004 - Aug 2005	0.18	0.12	0.09	0.08	0.13	0.13	0.17	0.20	0.21

One approach to evaluating the validity of the price relationships as supporting the Union Gas core market area is to compare the price relationships within the core market area to the price relationships within other market areas that have been determined to be competitive. We have used an analysis of price behavior in the New York/ Pennsylvania/Ohio/West Virginia market area to set a reference point for price differentials consistent with a competitive market. This market area includes National Fuel Gas, Columbia Gas Transmission and Dominion Transmission, as well as a number of smaller independent storage facilities in New York. FERC has frequently accepted the

New York and Pennsylvania market, including NFG, Dominion, and the New York independent storage operators, as a geographic market area for storage.[43] Other parties have suggested that the broader market including Columbia Gas Transmission is an integrated natural gas market. FERC has reviewed and not disagreed with analysis suggesting that this broader market area represents a geographic market area for storage.[44]

The results of this price analysis are shown in Tables 8 and 9. Table 8 shows the statistical relationship between natural gas prices at Niagara, Dominion Southpoint, Columbia Appalachia, and Dawn. For the period between 2001 and 2005, the geographic market area approved by the FERC (Niagara and Dominion Southpoint) had a price correlation coefficient (r^2) of .992, while the broader geographic region including Columbia Appalachia had a price correlation coefficient (r^2) of .974 between Niagara and Columbia Appalachia, and a price correlation coefficient (r^2) of .968 between Dominion South Point and Columbia Appalachia.

Table 8:
Natural Gas Price Correlations With Major Northeastern U.S. Storage Hubs

	1999-2005	2001-2005	1999	2000	2001	2002	2003	2004	2005\a
Natural Gas Price Correlation with Columbia Appalachia									
Niagara	0.984	0.974	0.990	0.999	0.998	0.977	0.944	0.825	0.982
Dominion South Point		0.968		0.999	0.999	0.986	0.921	0.965	0.993
Dawn	0.991	0.986	0.990	0.998	0.997	0.983	0.962	0.968	0.991
Natural Gas Price Correlation with Niagara									
Columbia Appalachia	0.984	0.974	0.990	0.999	0.998	0.977	0.944	0.825	0.982
Dominion South Point		0.992		0.998	0.998	0.994	0.989	0.894	0.988
Dawn	0.993	0.989	0.998	0.999	1.000	0.996	0.977	0.816	0.989
Natural Gas Price Correlation with Dominion South Point									
Niagara		0.992		0.998	0.998	0.994	0.989	0.894	0.988
Columbia Appalachia		0.968		0.999	0.999	0.986	0.921	0.965	0.993
Dawn		0.987		0.997	0.996	0.993	0.966	0.944	0.988

a) 2005 includes data through August

[43] See for example, paragraph 61 of FERC ORDER ISSUING CERTIFICATES (Issued October 6, 2003) Wyckoff Gas Storage Company, LLC Docket Nos. CP03-33-000, CP03-34-000, CP03-35-000. "We conclude that Wyckoff lacks market power in the relevant market and that its proposal to charge market-based rates, as conditioned below, is fair and equitable. This conclusion is consistent with our actions in Seneca Lake, Central New York, Honeoye, NE Hub, Avoca, Steuben, and NYSEG, where market-based rate storage proposals were granted in the same relevant geographic market area of New York and Pennsylvania as Wyckoff's proposal."

[44] 94 FERC 61,194 (February 23, 2001), Order Issuing Certificates and Authorizing Abandonment, Central New York Oil and Gas Company, LLC(CYNOG) for the Stagecoach Storage Field Project.

Referring back to Table 4, the prices at all of the major market centers in the Union Gas core competitive market region are highly correlated, indicating an integrated market with no long term pipeline constraints that would tend to separate the market into different competitive market regions. All of the price points within the core market area are more closely correlated with Dawn than the major points just outside of the core market area.

In addition, the market prices in the Union Gas core market area are also generally more closely correlated than the prices in New York/Pennsylvania market area regularly accepted by the FERC. The only exception to this finding, the 2001 – 2005 price correlation between Dawn and Niagara (r^2 of .989), was very close to the price correlation between Niagara and Dominion (r^2 of .992), and the longer term (1999 – 2005) price correlation between Niagara and Dawn (r^2 of .993) was slightly better. In both time periods, the correlation between Niagara and Dawn was significantly better than the correlation between Niagara and Columbia Appalachia (r^2 of .968). This price analysis indicates that the core competitive market region identified in this analysis has experienced price behavior consistent with the competitive market region commonly accepted by the FERC.

Table 9 shows the behavior of the price differentials between these market centers. The basis differential between the market centers averaged $0.07 to $0.12 (U.S.) between 2001 and 2005, and the long term (2001 – 2005) standard deviation of the locational basis ranges from $0.44 to $0.52. We conclude that price movements between market centers of a similar or lesser magnitude would be consistent with a fully competitive market area in regions where the markets are also well connected via available pipeline capacity. Arguably, the differential in price volatility separating the competitive and noncompetitive regions could be larger while remaining fully competitive.

Based on this criterion, storage capacity in the region including Northern Illinois and Indiana, Michigan, Ontario, and Niagara is within the same geographic market. The seasonal price differential at these points (shown in Table 6) generally has been less than $0.20 for the period since Vector and Alliance became available. In addition, the standard deviation in the daily basis between Dawn and these points (shown in Table 7) has been well below the NY/PA range for most of the time periods after completion of the Vector and Alliance pipelines.

The price analysis also indicates that storage capacity in Pennsylvania, West Virginia and Ohio owned by Columbia Gas Transmission and Dominion Transmission is closely linked to Dawn on a seasonal basis, but may be less closely coupled on a daily basis. The standard deviation of the daily basis between Dawn and Columbia Appalachia and between Dawn and Dominion Southpoint is significantly greater than observed in Michigan. As seen in Table 7, the standard deviation values are almost twice the

standard deviations designated as in the core competitive market during most of the time periods evaluated. In addition to the price volatility differences, there is an additional degree of separation in terms of physical infrastructure between the storage facilities for both the Dominion Transmission and Columbia storage systems, relative to the storage systems in the core competitive region. Hence, both the differential price behavior and differences in physical infrastructure linkages supports the separation of the two groups.

Table 9
Natural Gas Price Relationships in Major New York/Pennsylvania Competitive Storage Markets (U.S.$/MMBtu)

	Average Natural Gas Price			Differential Relative to Columbia Gas, Appalachia		Standard Deviation of Differential Relative to Columbia Gas, Appalachia	
	Columbia Appalachia	*Niagara*	*Dominion Southpoint*	*Niagara*	*Dominion Southpoint*	*Niagara*	*Dominion Southpoint*
Overall Average							
1999-2005	4.70	4.75	5.22	(0.05)	(0.12)	0.37	0.48
Jan 2001 - Aug 2005	5.25	5.31	5.37	(0.07)	(0.12)	0.44	0.52
Winter							
Nov 1999 - Mar 2000	2.63	2.68	2.85	(0.06)	(0.12)	0.07	0.10
Nov 2000 - Mar 2001	7.01	7.05	7.17	(0.05)	(0.16)	0.15	0.17
Nov 2001 - Mar 2002	2.57	2.67	2.63	(0.10)	(0.06)	0.08	0.08
Nov 2002 - Mar 2003	5.73	6.29	6.50	(0.57)	(0.77)	1.14	1.57
Nov 2003 - Mar 2004	5.70	5.98	5.88	(0.27)	(0.18)	0.58	0.20
Nov 2004 - Mar 2005	6.71	6.82	6.77	(0.11)	(0.07)	0.18	0.17
Summer							
Apr 1999 - Oct 1999	2.57	2.54		0.03		0.05	
Apr 2000 - Oct 2000	4.40	4.37	4.43	0.03	(0.03)	0.06	0.04
Apr 2001 - Oct 2001	3.61	3.59	3.63	0.02	(0.01)	0.06	0.05
Apr 2002 - Oct 2002	3.62	3.48	3.59	0.14	0.04	0.13	0.12
Apr 2003 - Oct 2003	5.42	5.46	5.53	(0.05)	(0.12)	0.08	0.10
Apr 2004 - Oct 2004	6.14	6.12	6.18	0.02	(0.04)	0.15	0.13
Apr 2005 - Aug 2005	7.79	7.65	7.83	0.15	(0.03)	0.15	0.07
Annual							
Nov 1999 - Oct 2000	3.65	3.66	3.95	(0.01)	(0.06)	0.08	0.08
Nov 2000 - Oct 2001	5.02	5.02	5.09	(0.01)	(0.08)	0.11	0.13
Nov 2001 - Oct 2002	3.19	3.15	3.19	0.04	(0.00)	0.16	0.11
Nov 2002 - Oct 2003	5.54	5.80	5.93	(0.26)	(0.38)	0.77	1.06
Nov 2003 - Oct 2004	5.96	6.06	6.06	(0.10)	(0.10)	0.42	0.17
Nov 2004 - Aug 2005	7.25	7.23	7.30	0.02	(0.05)	0.21	0.13
Seasonal Gas Price Difference							
Average	0.76	0.99	1.12	(0.23)	(0.21)		
Apr 1999 - Mar 2000	0.06	0.15		(0.09)			
Apr 2000 - Mar 2001	2.61	2.68	2.74	(0.07)	(0.13)		
Apr 2001 - Mar 2002	(1.04)	(0.92)	(1.00)	(0.13)	(0.04)		
Apr 2002 - Mar 2003	2.11	2.81	2.91	(0.71)	(0.81)		
Apr 2003 - Mar 2004	0.29	0.52	0.35	(0.23)	(0.06)		
Apr 2004 - Mar 2005	0.57	0.70	0.59	(0.13)	(0.02)		

Source: EEA analysis of daily price midpoints reported by Platt's Gas Daily for the referenced period.

Prices in Alberta, which is a major market center upstream of the core competitive market area, also exhibit markedly different behavior than prices at Dawn and the other market centers evaluated. Hence we conclude that storage capacity in Alberta should not be considered in the relevant geographic market, even though we recognize that storage in Alberta can be used as a competitive option to storage at Dawn.

The U.S. FERC accepted a similar geographic market definition when it accepted the WPS-ESI application for market-based rates in 2004. According to the FERC:

> "WPS-ESI's consultant, IGC, performed a market power analysis for natural gas storage designed upon what it considered to be the relevant geographic market. Based on the Commission staff's review and recommendations, the Commission finds that IGC's findings are reasonable and appropriate. IGC determined the relevant geographic market includes the geographic area traversed by the northern zone pipeline operated by ANR Pipeline Company (ANR) in Michigan, northern Indiana, Northern Illinois, and eastern Iowa. IGC's study concludes that the relevant geographic market also includes western Ontario, Canada, a region adjacent to ANR's interstate system, because the Canada/United States gas market is now highly integrated, such that analysis can properly incorporate Canadian storage fields. IGC's analysis contained over 100 storage fields located in the five state/province area in the defined geographic market."[45]

c. Qualitative criteria

As noted in the MEGs, other qualitative factors play a role in defining the relevant market. These include ease of switching suppliers, customer behavior, trade views and the like.

(i) Switching costs

The cost to a buyer of switching between storage suppliers within the core competitive market region is small. Users of storage generally do not make sunk investments that are tied to the use of a specific storage facility. The information systems, purchasing protocols, and accounting systems used by the customer to manage storage purchases tend not to be specific to any particular storage supplier. With the adoption of GISB/NAESB[46] standards and protocols, the process of managing nomination, scheduling, confirming gas has largely been standardized by the industry throughout North America. As a result, unlike the aforementioned example of switching to a new word processing program, there is only a minimal technical "learning curve" generating

[45] 108 FERC 61,061, WPS-ESI Gas Storage, LLC, Docket No. CP04-80-000, Issued July 13, 2004.

[46] Gas Industry Standards Board. In 2002, the gas wholesales standard setting process performed by GISB has been incorporated into the recently formed North American Energy Standards Board, NAESB.

additional costs associated with switching to another storage provider for customers that are already contracting for natural gas storage outside of their service territory

Instead, switching from one provider to another is accomplished via contractual arrangements. Hence, the largest switching costs tend to be knowledge costs. Selecting an alternative storage provider would require the knowledge to effectively compare different storage providers, which might require outside consulting assistance, or the development of a broader gas market evaluation capability in-house.

An alternative storage option could require a change in both storage and pipeline contracts since switching storage providers is likely to require adjustments in pipeline capacity held under contract used to inject natural gas into storage, as well as to deliver natural gas withdrawn from storage to the customer. For example, a natural gas marketer serving the Ontario market that switched from Union Gas storage to Michigan storage might require less year-round pipeline capacity from Chicago to Dawn, but would also potentially require more firm winter service from Michigan to Ontario.

These are not the type of costs that would render switching costly or difficult. As a result, we conclude that most customers could easily switch between storage suppliers in the relevant market.

(ii) Buyer behavior

In practice, Union Gas competes with storage in a variety of other locations, and owned by a variety of other competitors. Storage providers as far west as Alberta indicate that they intend to compete for storage customers throughout Canada and the Northeastern U.S. However, different customer groups tend to focus more heavily on certain areas and storage providers. Based on our review of publicly available data sources on storage capacity contracts such as the FERC Index of Customers[47], discussions with Union Gas staff, Union Gas storage customer comments provided by Union Gas, and the trade press, as well as EEA's analysis of gas market behavior, we have identified competitive market areas that differ somewhat based on the location of the customer.

For Ontario customers, Union Gas regularly competes with Enbridge storage, National Fuel Gas storage near Niagara, New York via backhaul, and Michigan storage with access to Ontario via the Great Lakes Pipeline and via MichCon and Vector. Union Gas also competes with companies that are remarketing storage capacity held on the Union system under long term contracts. Ontario customers also use seasonal natural gas deliveries on TCPL and Great Lakes which may include storage capacity in Alberta, and

[47] The U.S. FERC requires each FERC regulated pipeline and storage provider to post a list of customers holding firm pipeline or storage contracts, along with basic information on the contract including location, capacity, rate class, and term of contract.

Vector which may include storage capacity as far west as Illinois as an alternative to Ontario storage.

For U.S. customers such as Rochester Gas and Electric, Union Gas competes with Columbia, Dominion, National Fuel Gas storage in Southwestern New York and Pennsylvania, as well as other major and minor storage providers to the Southeast of Union's storage fields. Union also competes against storage providers in Michigan.

For customers in Michigan, Illinois, and Ohio, Union Gas competes with Michigan storage connected to Great Lakes Gas Pipeline and MichCon, as well as the storage providers located along the Vector pipeline running from Chicago to Dawn. Finally, Union Gas storage competes with seasonal natural gas deliveries on TCPL, Great Lakes, and Vector, which may include storage capacity in Alberta.

(iii) Trade views

There is limited trade press available concerning storage contracting practices in the region around Union Gas. However, the Dawn Hub is widely considered to be a liquid natural gas trading point by the natural gas trade. According to the October 2002 Energy Market Assessment Summary published by the National Energy Board (NEB) "In Canada, liquidity at AECO and Dawn is very high (p. 13)."

Liquidity in the gas market allows participants to acquire gas or liquidate positions quickly and without prohibitive transaction costs. Because the market price of gas reflects the value of gas at the wellhead plus the value of pipeline transportation and storage, liquidity in the gas market at Dawn provides a method to indirectly enter and exit the market for gas storage as well.

3. Conclusions with respect to the relevant market

Based on our analysis of the physical infrastructure, price behavior, and market views, we have designated storage capacity within Michigan, Northern Illinois, Northern Indiana, Ontario, and the National Fuel Gas Supply service territory in Western New York and Pennsylvania as the core competitive market region for Union Gas storage. There exists direct and relatively unconstrained physical linkages between these markets. In addition, the price behavior is consistent with the price behavior expected within an integrated market.[48] The core competitive market region provides a measure of the minimal relevant geographic market region for our analysis of natural gas storage market concentration. We conclude that storage customers can substitute storage at the market centers within the core competitive region with storage at Dawn (or the reverse).

[48] For all of the market centers other than Western New York during the 2003/2004 time period. The Western New York market is included in the Core Market based on market knowledge, and on price relationships prior to 2004.

Beyond that, storage customers can substitute storage on the Dominion Transmission and Columbia storage systems, but in so doing the customer must be mindful of additional daily price volatility risk. However, there are relatively direct physical linkages between the markets, and seasonal price behavior is consistent with an integrated market, indicating that Columbia Gas storage and Dominion Transmission can be expected to be directly competitive with Union Gas storage for some customers. We have included the storage capacity in these regions in our designation of the non-core competitive market for Union Gas storage.

Based on our analysis, the core competitive geographical market for Union Gas storage includes a total of 1,162 Bcf of storage working gas capacity, including:

- 152.2 Bcf of storage working gas capacity in Ontario owned by Union Gas;
- 92.4 Bcf of storage working gas capacity in Ontario owned and/or operated by Enbridge, net of any joint venture volumes with Union which are included in the Union number above;
- 627.3 Bcf of storage working gas capacity in Michigan owned by El Paso, CMS Energy, DTE Energy and others;
- 210.6 Bcf of storage working gas capacity in storage located in Illinois and Indiana; and
- 80.3 Bcf of storage working gas capacity located downstream of Niagara owned by National Fuel Gas (NFG). NFG owns 15.1 Bcf of storage in the Niagara area, and 80.3 Bcf of storage in New York and Pennsylvania. The NFG system is operated as an integrated system, hence the amount of storage included in the core area appropriately includes all of the NFG storage capacity.

A competitive analysis based solely on the alternatives available within the core market area is extremely conservative and understates the competitive options to customers of storage service at Dawn provided by the storage and pipeline facilities connected to the Columbia Appalachia and Dominion Southpoint market centers. To the extent that our analysis of competition within the core regional market indicates a moderate level of concentration, the storage alternatives available within the broader market only serve to increase the competitive options available. Consideration of the non-storage alternatives to storage (e.g., financial derivatives) would further reduce market concentration.

Including storage capacity in the non-core competition region adds an additional 597 Bcf of storage working gas capacity, primarily held by Dominion Transmission and Columbia Gas Transmission, to the storage capacity that competes with Union.

C. Market Shares and Concentration

The first step in determining market shares and concentration is to adopt a numeraire for measuring the size of the market and the size of individual suppliers. With this in hand, shares and concentration measures (e.g., concentration ratios and HHIs) can be calculated.

1. Numeraire

There are a number of volumetric measures used to quantify the capacity of an underground storage facility. These include:

- *Total gas storage capacity* is the maximum volume of gas that can be stored in an underground storage facility by design and is determined by the physical characteristics of the reservoir and installed equipment.
- *Base gas (or cushion gas)* is the volume of gas intended as permanent inventory in a storage reservoir to maintain adequate pressure and deliverability rates throughout the withdrawal season.
- *Working gas capacity* refers to total gas storage capacity minus base gas.
- *Deliverability* is most often expressed as a measure of the amount of gas that can be delivered (withdrawn) from a storage facility on a daily basis. Also referred to as the deliverability rate, withdrawal rate, or withdrawal capacity, deliverability is usually expressed in terms of millions of cubic feet per day (MMcf/day) in the U.S., and gigajoules per day (GJ/day) in Canada. The deliverability of a given storage facility is variable, and depends on factors such as the amount of gas in the reservoir at any particular time, the pressure within the reservoir, compression capability available to the reservoir, the configuration and capabilities of surface facilities associated with the reservoir, and other factors. In general, a facility's deliverability rate varies directly with the total amount of gas in the reservoir: it is at its highest when the reservoir is most full and declines as working gas is withdrawn.[49]
- *Injection capacity (or rate)* is the complement of the deliverability or withdrawal rate–it is the amount of gas that can be injected into a storage facility on a daily basis. As with deliverability, injection capacity is usually expressed in MMcf/day, although dekatherms/day is also used. The injection capacity of a storage facility is also variable, and is dependent on factors comparable to those

[49] Developing a consistent database for storage deliverability is complicated by different reporting practices of different companies. Companies can report either maximum deliverability, or design deliverability. Most companies report only maximum deliverability, which typically exceeds design day deliverability. Maximum deliverability values are used throughout the report. Union Gas and Enbridge typically refer to design day deliverability. For both Union Gas and Enbridge, the design day deliverability is very close to the maximum deliverability, and the values used in this report have been adjusted to reflect maximum deliverability.

> that determine deliverability. By contrast, the injection rate varies inversely with the total amount of gas in storage: it is at its lowest when the reservoir is most full and increases as working gas is withdrawn.[50]

Of these, the most meaningful are working gas capacity and deliverability. Deliverability gives an indication of how often a pool can be cycled. Generally speaking the greater a reservoir's working gas capacity and the greater its deliverability, the greater the facility's ability to supply the market. In our measure of market concentration both numeraires are used.

2. Concentration levels

For natural gas storage, there are two ways in which to measure the market share. The first method focuses on the ownership of the capacity. This is the traditional approach in market concentration analysis. However, natural gas storage and transportation are structured as a "contract carriage" industry that confers upon the shippers strictly defined tariff rights. As such, control of the use of the facility reside with the parties that hold the firm capacity contracts, not with the facility owner. As a result, in the short term, market concentration can be influenced by "control" of capacity. We deal with each of these in turn.

a. Owned Capacity

Union Gas competes against a significant number of competitors in the core competitive market region. The list of companies owning storage in the core competitive market region is shown in Tables 10 and 11. Table 10 shows storage capacity by operating company. Table 11 aggregates the storage capacity held by affiliated companies. The aggregated values shown in Table 11 are the "conservative" measure for the market concentration analysis.

Union Gas owns about 13 percent of the total storage working gas capacity in the core competitive region. This is well below the 35 percent market share considered to be of concern by the Canadian Competition Bureau with respect to the unilateral exercise of market power. In addition, the combined market share of the four largest firms (i.e., the four-firm concentration ratio or CR_4) is 48 percent. Recall that according to the Competition Bureau's MEGS, a CR_4 below 65 percent is unlikely to raise concerns over the interdependent exercise of market power. We have also calculated HHIs based on working gas and deliverability. Recall that the HHI is the "sum of the squares of market shares" (the formula was set out in footnote 23). The HHI takes a maximum value with monopoly (i.e., a market share of 100% as a fraction is 1, and $1^2 = 1$), and becomes very

[50] U.S. Energy Information Administration, *The Basics of Underground Storage*, available at: http://www.eia.doe.gov).

small when there are a large number of sellers with small and similar market shares. Recall also that U.S. anti-trust authorities and FERC become concerned when the HHI exceeds 0.18. From Table 10 it is seen that the HHI is well below this threshold when based on working gas (0.089) or deliverability (0.092).

Table 10
Physical Storage Capacity in the Union Gas Core Competitive Market Area
(Concentration by Operating Company)

Operating Company	Parent Company	State/ Province	Working Gas [MMscf]	Peak Delivery [MMscf]		Working Gas Market Share	Peak Delivery Market Share
Union Gas	***Duke***	***Ontario***	***152,200***	***2,300***		***13.1%***	***9.1%***
Enbridge	Enbridge	Ontario	92,000	*1,792*	*est*	7.9%	7.1%
ANR Pipeline	El Paso	Michigan	117,000	*3,431*	*est*	10.1%	13.5%
ANR Storage	El Paso	Michigan	55,673	950		4.8%	3.7%
Blue Lake Storage	El Paso	Michigan	47,086	657		4.1%	2.6%
Eaton Rapids Gas Storage	El Paso/Semco	Michigan	13,534	120		1.2%	0.5%
Consumers Energy	CMS Energy	Michigan	142,800	*3,665*	*est*	12.3%	14.5%
Mich Con	DTE Energy	Michigan	124,444	3,300		10.7%	13.0%
Washington 10 Storage Corp.	DTE Energy	Michigan	60,500	*641*	*est*	5.2%	2.5%
Washington 28	DTE Energy	Michigan	9,725	275		0.8%	1.1%
Michigan Gas Utilities	Aquila	Michigan	5,100	*116*	*est*	0.4%	0.5%
Semco Energy Gas Co.	Semco Energy	Michigan	5,015	184		0.4%	0.7%
Bluewater Gas Storage	Plains All American Pipeline	Michigan	24,500	700		2.1%	2.8%
WPI- ESI Gas Storage	WPS Resources	Michigan	3,000	100		0.3%	0.4%
Lee 8	Vectren/Citizen's Gas	Michigan	2,450	*55*	*est*	0.2%	0.2%
Southwest Gas Storage Co.	Southern Union Co.	MI/IL	20,603	*430*	*est*	1.8%	1.7%
National Fuel Gas Supply	National Fuel Gas Supply	NY/PA	80,315	1,342		6.9%	5.3%
Natural Gas Pipeline of America	Kinder Morgan	Illinois	25,000	1,270		2.2%	5.0%
Nicor Gas	Nicor, Inc.	Illinois	144,300	2,800		12.4%	11.0%
Peoples Gas Light & Coke Co.	Peoples Energy	Illinois	28,000	920		2.4%	3.6%
Northern Indiana Public Service Co.	NiSource	Indiana	6,663	220		0.6%	0.9%
Indiana Gas Company	Vectren	Indiana	2,530	75		0.2%	0.3%
Total			**1,162,438**	**25,343**			
4 Firm Concentration			**563,744**	**12,065**		**48.5%**	**47.6%**
HHI						**0.089**	**0.092**

Data Sources:

Natural Gas Intelligence, Natural Gas and Storage in the United States and Canada (2004/2005)

Michigan Public Service Commission, Natural Gas Field Storage Summary, 2005

Company Websites, SEC Filings: Form 10-K

Table 11
Physical Storage Capacity in the Union Gas Core Competitive Market Area
(Concentration by Parent Company)

Parent Company	Working Gas [MMscf]	Peak Delivery [MMscf]		Working Gas Market Share	Peak Delivery Market Share
Duke	***152,200***	***2,300***		***13.1%***	***9.1%***
Enbridge	92,000	*1,792*	*est.*	7.9%	7.1%
El Paso	226,526	*5,098*	*est.*	19.5%	20.1%
CMS Energy	142,800	*3,665*	*est.*	12.3%	14.5%
DTE Energy	194,669	*4,216*	*est.*	16.7%	16.6%
Aquila	5,100	*116*	*est.*	0.4%	0.5%
Semco Energy	11,782	244		1.0%	1.0%
Plains All American Pipeline	24,500	700		2.1%	2.8%
WPS Resources	3,000	100		0.3%	0.4%
Citizen's Gas	1,225	*27*	*est.*	0.1%	0.1%
Southern Union	20,603	*430*	*est.*	1.8%	1.7%
National Fuel Gas Supply	80,315	1,342		6.9%	5.3%
Kinder Morgan	25,000	1,270		2.2%	5.0%
Nicor, Inc.	144,300	2,800		12.4%	11.0%
Peoples Energy	28,000	920		2.4%	3.6%
NiSource	6,663	220		0.6%	0.9%
Vectren	3,755	*102*	*est.*	0.3%	0.4%
Total	**1,162,438**	**25,343**			
4 Firm Concentration	**717,695**	**14,414**		**61.7%**	**56.9%**
HHI				**0.127**	**0.122**

Data Sources:

Natural Gas Intelligence, Natural Gas and Storage in the United States and Canada (2004/2005)

Michigan Public Service Commission, Natural Gas Field Storage Summary, 2005

Company Websites, SEC Filings: Form 10-K

When shares are based upon ultimate ownership (rather than operating company), the CR_4 increases to 62 percent, still below the MEGs threshold of concern (see Table 11). Moreover, since the Union Gas storage constitutes all of the Duke Energy storage capacity within the core competitive market area, the Duke share is the same as the Union Gas share using this definition of control.[51]

[51] A Duke subsidiary (Market Hub Partners) has two applications before the Board to develop independent storage fields in Ontario. These fields are relatively small, and if built would have only minor impacts on the results of the concentration analysis.

We have also calculated the HHI using the parent company's market share. At 0.127 for working gas capacity and 0.122 for deliverability, market concentration is still well below the 0.18 threshold for concern used by United States authorities.

b. "Controlled" capacity

In practice, Union Gas competes against a broader set of competitors when contractual control of storage capacity is considered rather than physical ownership of storage capacity. Union Gas competes against its own physical storage capacity when other companies that hold long term rights to Union Gas storage rebundle or remarket the capacity held under these contracts to third parties that might otherwise contract with Union Gas directly. However, market concentration analysis is appropriately conducted on the basis of ownership since the capacity will revert to Union Gas when the contracts terminate.

c. Core and Non-Core Competitive Region

Including the non-core competitive region storage capacity in the relevant geographic market has the expected effect of lowering concentration. This is shown in Tables 12 and 13. The Union Gas share drops to 9 percent for working gas, and to 6 percent in terms of deliverability. The CR4 falls to 49 percent for working gas, and to 42 percent for deliverability. The HHI changes slightly for both working gas and deliverability.

In summary, using the most conservative measures of concentration (i.e., ultimate ownership within the core market) results in concentration levels that are below the thresholds for concern as identified by both Canadian and U.S. anti-trust and regulatory authorities. Importantly, Union Gas/Duke Energy's market share is well below the Canadian threshold for concern over the unilateral exercise of market power. When contractual control is used, or when the non-core market participants are included, Union Gas/Duke Energy's market share becomes even less of a potential issue.

D. Barriers to Entry

The storage services market contains several potential barriers to entry. However, we conclude that theses potential barriers are not prohibitive in the market today and do not foresee any factors that would result in barriers that would alter the competitive nature of the market. The potential barriers that were analyzed are discussed below.

1. Capital Costs

Storage field development tends to be highly capital intensive, with a large up-front investment, but relatively low operating costs. In the competitive market area, most

storage field development will occur in depleted natural gas fields, or in salt caverns. In either case, new storage field development requires substantial infrastructure development, including installation of natural gas pipelines to connect with the existing transmission system and compression required to inject natural gas into the storage fields as well as to pressurize gas withdrawn from storage. Storage field development costs also include the cost of cushion gas and well drilling and cavern development costs as well as costs associated with storage field monitoring and operational controls. Often, the largest cost of developing a new storage field is the cost of installing pipeline capacity from the existing pipeline transmission system to the storage field.

Table 12: Physical Storage Capacity in the Union Gas Core and Non-Core Competitive Market Area (Concentration by Operating Company)

Operating Company	Parent Company	State/ Province	Working Gas [MMscf]	Peak Delivery [MMscf]	Working Gas Market Share	Peak Delivery Market Share
Union Gas	***Duke***	***Ontario***	***152,200***	***2,300***	***8.7%***	***6.4%***
Enbridge	Enbridge	Ontario	92,000	*1,792 est*	5.2%	5.0%
ANR Pipeline	El Paso	Michigan	117,000	*3,431 est*	6.7%	9.5%
ANR Storage	El Paso	Michigan	55,673	950	3.2%	2.6%
Blue Lake Storage	El Paso	Michigan	47,086	657	2.7%	1.8%
Eaton Rapids Gas Storage	El Paso/Semco	Michigan	13,534	120	0.8%	0.3%
Consumers Energy	CMS Energy	Michigan	142,800	*3,665 est*	8.1%	10.2%
Mich Con	DTE Energy	Michigan	124,444	3,300	7.1%	9.1%
Washington 10 Storage Corp.	DTE Energy	Michigan	60,500	*641 est*	3.4%	1.8%
Washington 28	DTE Energy	Michigan	9,725	275	0.6%	0.8%
Michigan Gas Utilities	Aquila	Michigan	5,100	*116 est*	0.3%	0.3%
Semco Energy Gas Co.	Semco Energy	Michigan	5,015	184	0.3%	0.5%
Bluewater Gas Storage	Plains All American Pipeline	Michigan	24,500	700	1.4%	1.9%
WPI- ESI Gas Storage	WPS Resources	Michigan	3,000	100	0.2%	0.3%
Lee 8	Vectren/Citizen's Gas	Michigan	2,450	*55 est*	0.1%	0.2%
Southwest Gas Storage Co.	Southern Union Co.	MI/IL	20,603	*430 est*	1.2%	1.2%
National Fuel Gas Supply	National Fuel Gas Supply	NY/PA	80,315	1,342	4.6%	3.7%
Natural Gas Pipeline of America	Kinder Morgan	Illinois	25,000	1,270	1.4%	3.5%
Nicor Gas	Nicor, Inc.	Illinois	144,300	2,800	8.2%	7.8%
Peoples Gas Light & Coke Co.	Peoples Energy	Illinois	28,000	920	1.6%	2.5%
Northern Indiana Public Service Co.	NiSource	Indiana	6,663	220	0.4%	0.6%
Indiana Gas Company	Vectren	Indiana	2,530	75	0.1%	0.2%
Dominion Transmission	Dominion Resources	WV/PA/NY	319,521	5,513	18.2%	15.3%
Columbia Gas Transmission	NiSource	WV/PA/NY	245,000	4,445	13.9%	12.3%
Steuben Gas Storage	Arlington Storage Partners	New York	6,200	60	0.4%	0.2%
NYSE&G	Energy East Corp.	New York	1,450	145	0.1%	0.4%
Honeoye Storage	EHA LLC	New York	6,718	*41 est*	0.4%	0.1%
Central New York O&G	Stagecoach Holding LLC	New York	13,600	500	0.8%	1.4%
National Fuel Gas Supply	National Fuel Gas Supply	NY/PA (Steuben Cty	3,800	49	0.2%	0.1%
Total			**1,758,727**	**36,096**		
4 Firm Concentration			**861,021**	**15,058**	**49.0%**	**41.7%**
HHI			**0.09**	**0.08**		

Data Sources:

Natural Gas Intelligence, Natural Gas and Storage in the United States and Canada (2004/2005)

Michigan Public Service Commission, Natural Gas Field Storage Summary, 2005

Company Websites, SEC Filings: Form 10-K

Table 13
Physical Storage Capacity in the Union Gas
Core and Non-Core Competitive Market Area
(Concentration by Parent Company)

Parent Company	Working Gas [MMscf]	Peak Delivery [MMscf]		Working Gas Market Share	Peak Delivery Market Share
Duke	***152,200***	***2,300***		***8.7%***	***6.4%***
Enbridge	92,000	*1,792*	*est.*	5.2%	5.0%
El Paso	226,526	*5,098*	*est.*	12.9%	14.1%
CMS Energy	142,800	*3,665*	*est.*	8.1%	10.2%
DTE Energy	194,669	*4,216*	*est.*	11.1%	11.7%
Aquila	5,100	*116*	*est.*	0.3%	0.3%
Semco Energy	11,782	244		0.7%	0.7%
Plains All American Pipeline	24,500	700		1.4%	1.9%
WPS Resources	3,000	100		0.2%	0.3%
Vectren	3,755	*102*	*est.*	0.2%	0.3%
Citizens Gas	1,225	*27*	*est.*	0.1%	0.1%
Southern Union	20,603	430		1.2%	1.2%
National Fuel Gas Supply	84,115	1,391		4.8%	3.9%
Kinder Morgan	25,000	1,270		1.4%	3.5%
Nicor, Inc.	144,300	2,800		8.2%	7.8%
Peoples Energy	28,000	920		1.6%	2.5%
NiSource	251,663	4,665		14.3%	12.9%
Dominion Resources	319,521	5,513		18.2%	15.3%
Arlington Storage Partners	6,200	60		0.4%	0.2%
Energy East Corp.	1,450	145		0.1%	0.4%
EHA LLC	6,718	*41*	*est.*	0.4%	0.1%
Stagecoach Holding LLC	13,600	500		0.8%	1.4%
Total	**1,758,727**	**36,096**			
4 Firm Concentration	**992,379**	**19,492**		**56.4%**	**54.0%**
HHI	**0.109**	**0.101**			

Data Sources:
Natural Gas Intelligence, Natural Gas and Storage in the United States and Canada (2004/2005)
Michigan Public Service Commission, Natural Gas Field Storage Summary, 2005
Company Websites, SEC Filings: Form 10-K

Expansion of existing fields is often a lower cost alternative to new field development. Much of the necessary infrastructure is likely to already be available, reducing up front costs. New wells, or additional compression capacity can often create incremental storage deliverability at a lower cost than new storage development.

2. Regulatory Barriers

In both Canada and the United States, storage field development is highly regulated, with both new storage fields and expansion of existing storage fields subject to approval by a variety of regulatory agencies. In the United States, current FERC policy is to promote development of third-party storage, and to reduce regulatory barriers to entry, including approval of market based rates and forbearance from the regulation of earnings for storage facilities lacking market power. In Ontario, the OEB has also adopted a more market-based approach to regulation of storage rates but continues to regulate storage return on investment, and has yet to determine what incentives will be extended to promote expansion of existing facilities or new storage development.

In addition, certain existing OEB policies discourage storage development in Ontario. The two Bcf blanket limitation on contract review, combined with the lengthy approval process for larger contracts can create significant market uncertainties and discourage storage development and optimal use of Ontario storage capacity.

3. System interconnection Barriers

Provision of storage services requires interconnection with the existing natural gas pipeline system. Interconnection can be difficult in locations with no or constrained pipeline capacity entering or existing the immediate area of the potential storage location.

E. Impact of Barriers to Entry Outside of Ontario

As demonstrated by recent market developments, these barriers to entry have not proved to be a significant hindrance to the development of new and expanded storage capacity in the competitive market area outside of Ontario.

- There are a number of storage field developments currently underway in up-State New York. These include:
  - Central New York Oil and Gas Company (CNYOG) completed initial development of the Stagecoach Storage Project located in South Central New York State in 2002. This greenfield storage project consists of two depleted fields with an initial maximum working gas capacity of 13.6 Bcf, with withdrawals of 500 MMcf/d and injections of as much as 250 MMcf/d. The storage fields are interconnected initially with the facilities of Tennessee Gas Pipeline Company. CNYOG is pursuing further expansion of the Stagecoach storage facility. The Stagecoach storage facility is located downstream of Niagara, and competes with Union Gas storage for customers in the Northeastern United States.

- Central New York Oil and Gas has completed a successful nonbinding open season on Phase II of the Stagecoach storage project, and expects to bring 13 BCF of additional storage capacity on-line in 2007.

- The SemGas, L.P. Wyckoff Gas Storage project, a new storage field development project in Steuben County, New York, received approval from the FERC to charge market based rates in October, 2003. Six Bcf of working gas capacity in the Wyckoff Storage project is expected to be commercially available by July, 2006.

- SemGas, L.P. has reinitiated development of the old Avoca Gas Storage project. The project has been renamed the Cohocton Valley Natural Gas Storage. If completed, this project will add five Bcf of high deliverability storage capacity to the Union Gas core competitive market region by 2009.

- Steuben Gas Storage Company has announced plans to develop the Thomas Corners storage field, adding 5.7 Bcf of storage working gas capacity in upstate New York.

- Storage capacity in Michigan is also expanding to serve customers in the Union Gas core market area.
  - WPS Energy Services recently received approval to charge market based rates at the Kimball 27 gas storage field. The Kimball 27 gas storage field is a greenfield storage facility with 3 Bcf of working gas capacity located in St. Clair County, Michigan. The facility interconnects with the ANR pipeline, which is directly connected to Michigan Consolidated Gas Company and to Dawn. The facility also has access to Great Lakes Gas Transmission and to Vector Pipeline. The facility began operation in September 2001, and on July 13, 2004 the facility received authority from the U.S. FERC to charge market based rates.

  - Sempra Energy Global Enterprises completed initial development and began initial operation of the Bluewater Gas Storage facility in St. Clair, Michigan in May of 2004. The facility was sold to Plains All American Pipeline L.P. in September of 2005.

  - In April 2006, DTE Gas Storage is due to complete an expansion of the Washington 10 Storage field from 42.5 Bcf to 65 Bcf of working gas capacity with a new lateral to Vector/MichCon. DTE Gas storage has announced an intent to develop other nearby storage fields to create a new storage hub.

- EnCana recently expanded its storage capacity near the AECO-C Hub by 40 percent to 135 Bcf.[52] Even though this capacity is outside of the competitive market area, the EnCana storage provides competitive storage options to all customers using the TransCanada mainline, including Dawn storage customers, as long as excess capacity exists on the TransCanada Mainline.

F. Impact of Barriers to Entry in Ontario

Expansion of storage field capacity in Ontario has not kept pace with developments outside of Ontario.

- Northern Cross, Tribute Resources, and MHP have made proposals to develop small greenfield storage facilities in Ontario totaling about six Bcf of working gas capacity. Tribute Resources is proceeding with development, while Northern Cross and MHP have suspended their applications. When and if built, these storage facilities may connect directly to the Union Gas distribution system, and would compete directly with Union Gas storage.

- Union Gas and Enbridge Gas have taken a number of steps to increase working gas capacity and deliverability at existing storage fields but have not developed any new storage fields since Union Gas completed development of the Century pools in 2001.

- CanEnerco Limited developed the Chatham D storage field in the late 1990's, but entered bankruptcy in 2001 and transferred the storage field to Enbridge Gas.

The lack of new Ontario storage field development by both existing and new storage field developers in a market environment where significant storage development has occurred in the U.S. both upstream and downstream of Ontario suggests that the Ontario incentive and regulatory structures may be inhibiting storage development in Ontario.

[52] On June 20, 2005, Encana announced its intent to divest all storage assets, including the capacity at the AECO Hub.

IV. FINDINGS AND RECOMMENDATIONS

A. Competitive Finding for Union Gas Ex-Franchise Storage Services

We find that the market structure for storage services in the core competition region does not raise competition policy concerns under either Canadian or United States' guidelines. Specifically, moderate levels of seller concentration and potential market entry suggest a competitive structure and the absence of market power. Moreover, because of its modest market share and the ready availability of alternatives, we find that Union Gas does not have sufficient market power to significantly influence the price of natural gas storage within its geographic market. This conclusion holds true for both the core competitive region defined above as well as for the more broadly defined relevant geographic market.

If Union Gas is to attract customers to the Union Gas storage located at Dawn, Union must provide services that enable these customers to utilize storage services so as to lower their overall natural gas costs relative to the next best alternative. Hence, Union Gas can charge no more than the prevailing market price for storage alternatives and /or other substitute services including seasonal use of pipeline capacity that provide the same value as provided by Union Gas storage.

By utilizing the traditional methodology for the examining market structure and finding that the market for storage is relatively unconcentrated, the analysis would support a finding that the Board should forbear price regulation for *ex-franchise* storage services. Such a finding would be consistent with the November 18, 2004 submission to the Ontario Energy Board by the Commissioner of Competition, which stated:

> Open, competitive markets provide the most generally effective means to promote the efficient, innovative and low cost supply of products. The Bureau accordingly supports their establishment except where it can be demonstrated that such markets are not feasible or that the costs of establishing them would outweigh their benefits. [53]

The comments go on to present the steps for analysis of where competitive markets should be established.

> In a network industry such as natural gas, determining where competitive markets should be established entails unbundling the services of the incumbent utility and eliminating regulatory entry barriers into the potentially competitive functions, while maintaining regulatory control of the monopoly functions. The key first step is identifying the functions that must be performed for natural gas delivery.

[53] Final Submission of Commission of Competition, NFG, P. 4

> These functions must then be assessed to determine whether each of the unbundled functions should be governed by regulation or whether competition is preferable.[54]

By stating that "open and competitive markets should be established except where it can be demonstrated that such markets are not feasible or that the costs of establishing them would outweigh their benefits," the Commissioner of Competition correctly identifies the appropriate standard for analysis of regulation. In the case of *ex-franchise* storage services, there are effectively no additional costs or losses of economies of scope or scale to "outweigh" the benefits of competition. Granting rate forbearance in order to foster an open and competitive market for *ex-franchise* storage services would not require any new systems, any change in gas pipeline business practices or any changes in Federal pipeline regulations in Canada or the United States. Current open access regulations in Canada and the United States are sufficient to assure that deregulated Union Gas storage services would be available on a non-discriminatory basis. Indeed the only real change in granting regulatory forbearance and allowing retention of earnings for storage provided to ex-franchise customers would be a reduction in the costs of regulatory oversight of *ex-franchise* storage contracts and transactions, and an elimination of the cross subsidy that currently exists between in-franchise and ex-franchise customers.

B. Extrapolation of Results to In-franchise Storage

Our conclusions apply to the supply of natural gas storage to ex-franchise customers. Without considerably more analysis it is not possible to conclude that market-based rates should also be applied to storage dedicated to serve in-franchise customers. While we are reasonably confident that absent regulation in-franchise customers, or their agents, would find an abundance of competitive alternatives to Union Gas storage, we are not confident that the benefits would outweigh the costs of such a policy change. *In-franchise* utility services, which are provided in conjunction with storage services, exhibit economies of scope and scale common to utilities. A finding that it is appropriate to forbear from regulation of in-franchise storage would necessitate an increase in the election of unbundled storage services by in-franchise customers. The lack of a substantial market share for unbundled storage services indicates that current customers prefer the bundled service, which captures the economies of scale and scope common to utility delivery services. Termination of the bundled services could raise the total costs of serving in-franchise customers. Without a detailed analysis of the potential impact on costs we are unable to opine on the desirability of applying market-based rates to in-franchise storage.

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[54] Ibid.

C. Benefits to Ontario Attributable to Forbearance from Rate Regulation of Ex-Franchise Storage Services

There are real and substantial benefits to Union customers and Ontario from a more market responsive *ex-franchise* storage market. While we have not prepared a quantitative forecast of the likely impacts on storage investment of a move to market based rates, based on the U.S. experience, we believe that market based rates for storage capacity will lead to increased efficiency of storage use, and to additional investment in storage capacity in Ontario.

1. Increased Efficiency of Storage Use

Allowing Union Gas to price storage services at market prices in a manner that is unfettered by requirements for regulatory pre-approval of the contract will improve the economic efficiency of the market for storage. These efficiency benefits arise from two sources.

Economic efficiency is created when existing capacity is allocated to the customer that values the product the most. The desirability of achieving improvements in "allocative efficiency" has been recognized by the Board and has been enhanced to a degree through the existing program of Market-based Rates for in-franchise storage services. Nevertheless, the limitations of pre-approval, size and term inhibit efficiency by preventing Union from negotiating and executing agreements in a timely fashion with shippers that may value the storage more than a shipper that can tolerate the restrictions.

For example, the U.S. FERC has found that "…electric generators are much less likely to sign traditional long-term firm contracts, but may be more interested in the type of flexible pricing proposals offered uniquely under market-based rates."[55] These types of customers are more likely to desire flexibility and speed in contracting practices and will go to storage providers able to meet their requirements.

Beyond that, enacting a framework that relies on the competitive market to allocate storage sends the appropriate price signals to market participants. Proper price signals improve the allocation of existing storage. Additionally, proper price signals improve the efficiency of the market by providing incentives to invest and construct in new storage capacity when it is required.

2. Increased Efficiency of Storage Investment

Improving the economic efficiency in the broader natural gas market by increased investment in storage provides direct and indirect benefits to Union Gas Customers. Current price behavior at Dawn and throughout Ontario results from market events well beyond the borders of the Province. Increases in natural gas demand for power generation in New England or New York can create "demand pull" at Dawn resulting in increased price pressure in Ontario that affects Union system gas supplies as well as gas

[55] FERC, 18 CFR Part 284 (Docket Nos. RM05-23-000 and AD04-11-000), Rate Regulation of Certain Underground Storage Facilities, December 22, 2005, p. 5.

prices for third party providers. Similarly, a cold weather system that increases Ontario heating requirements will almost inevitably increase gas requirements in the Midwest and Northeast United States. When this occurs, gas prices throughout the entire region react to the increases in demand.

Increasing the total amount of storage capacity and deliverability can dilute some of the effects of fluctuations in gas demand and thereby mute the severity of gas price volatility compared to the volatility that would exist in the absence of the additional storage. As a result, Union Gas and Ontario customers benefit indirectly in terms of reduced volatility from the development of storage when Union or other storage providers add storage to meet *ex-franchise* requirements.

The benefits that arise from additions to storage capacity to Union Gas customers and Ontario are not limited to the impacts on gas prices. When Union Gas competes successfully to meet storage requirements of other ex-franchise customers in Ontario, the market is indicating that Union is in the best position to meet that Ontario needs in the most economic fashion. The result of these "arms-length" transactions in the open and competitive market provides those Ontario consumers with the lowest cost service available.

Beyond these economic benefits, there are other benefits that are created through increased investment by Union and other storage providers that could result from rate forbearance in the ex-franchise storage market. As discussed previously, storage provides important operational and reliability benefits. Importantly, these benefits are greatest in the immediate proximity to the storage facility and decrease as the distance from the storage facility increases. As a result, Ontario and Ontario customers receive more reliability and operational benefit from storage to meet Northeast U.S. requirements if the storage is built in Ontario than if the storage is located in New York, Pennsylvania, or any other location. In other words, even though Ontario customers pay nothing for a contract between Union and a gas shipper in the Northeast U.S., the Ontario gas customers get the benefits of the operational advantages created by more storage in Ontario.

In addition, Ontario receives economic benefits by providing services to other Provinces and to the U.S. When Union Gas sells storage to gas shippers in the U.S., economic activity in the Province and Canada is increased. In these instances, Ontario and Canada capture an additional element of the natural gas value chain.