
THE USE OF QUANTITY TERMS TO IMPROVE EFFICIENCY AND STABILITY IN INTERNATIONAL GAS SALES & PURCHASE AGREEMENTS

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Synopsis: Long-term Gas Sales & Purchase Agreements (GSPAs) continue to play an important role during the early development of international gas markets. The success of the GSPA depends in large part on the parties' ability to match appropriate contractual terms with the specific circumstances of the seller's upstream development and the buyer's downstream consumption. This process can become quite complex if the gas buyer's demand varies from one season to another. In such a case, the gas seller may be required to build excess production, processing, and transportation capacity that is only used during a few months each year. While the incorporation of such excess capacity can result in higher gas prices, a variety of external and internal options exist to minimize excess capacity.

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I. INTRODUCTION

This article focuses on the use of long-term GSPAs to facilitate the growth of gas markets in developing countries. In the foundational stages of a gas market, the relationships between gas sellers (“Seller”) and gas buyers (“Buyer”) are often bilateral, with each party making substantial capital investments that are dependent on the other’s performance. Sellers may spend billions of dollars developing a gas field and building processing and transportation facilities to deliver gas to a single buyer. The Buyer may in turn make similar expenditures on electricity generation plants or industrial facilities that depend on the delivery of gas. GSPAs guarantee these obligations of delivery and purchase over periods of as long as thirty years.

This Article examines the connection between GSPA quantity terms and the stability and efficiency of the long-term relationship between a seller and a buyer. In section II, the general objectives of long-term GSPAs are discussed, particularly how the stability and efficiency of a GSPA may depend on the parties’ ability to calibrate the circumstances of the Seller’s upstream development with the Buyer’s downstream consumption. Section III discusses the challenges associated with gas markets where the Buyer’s gas usage varies substantially from season to season and ways in which external (*i.e.*, third party) cooperation can be used to minimize the excess capacity. In section IV, the article provides an overview of the specific contractual terms used in GSPAs to establish the parties’ quantity rights and explains how these terms can be configured in ways to minimize excess capacity, thereby increasing the efficiency and stability of GSPAs without having to rely upon the availability or cooperation of third parties.

II. OBJECTIVES OF INTERNATIONAL GAS SALES & PURCHASE AGREEMENTS

Many international gas markets are evolving in a manner that resembles the United States’ gas industry in the early part of the twentieth century. During that time in the United States:

[natural gas facilities] were often “transaction-specific” assets - - *i.e.*, essentially dedicated to the natural gas fields from which they transported natural gas and/or the particular natural gas utilities to which they transported it. The assets, once constructed, had little value except with respect to serving the upstream or downstream markets to which they were attached. The investments necessary to construct such facilities would not be undertaken absent assured revenue streams from one or both of these sets of upstream or downstream parties.¹

Similarly, international gas projects are usually constructed for a limited number of specific, large end-use customers, such as gas-fired electricity plants or industrial facilities like aluminum or steel plants. Before either set of facilities is constructed, both the Seller and the Buyer will wish to protect their prospective investments by entering into a GSPA of sufficient quantities and terms to ensure recovery of those investments.²

One difference between the development of the United States gas market and international markets is that the buyer of natural gas in an international market is more likely to be the government, rather than a private, investor-owned company. Even in locations where private companies are responsible for construction and operation of electricity plants and industrial facilities, the government is likely to be an intermediary which purchases the gas and then resells it.³ As such, the government is usually in a position to exercise oversight of the gas market through negotiation of the GSPA, rather than through a formal regulatory process.

Foreign governments typically have access to sophisticated personnel (or consultants) who work to ensure that the cost of any gas project is reasonably transparent. These personnel seek to understand the basis for the estimated cost of producing and delivering the gas, including how much the Seller will invest in facilities, the upstream gas price (if the Seller purchases any of the gas from a third party), the project's operating expenses, and what a reasonable rate of return might be for the Seller's investors. These inquiries resemble those that government regulators have made in the United States under "cost of service" ratemaking, which is:

an administrative effort to determine the costs of a firm, including the cost of capital, and then allow the firm to set prices sufficient only to cover those costs. The regulator chooses a test year, adds that year's operating costs, depreciation, and taxes, and adds to that sum a reasonable profit (determined by multiplying a reasonable rate of return times the "rate base," *i.e.* investment, which is determined by taking historical investment and subtracting prior depreciation), thus giving the firm's "revenue requirement." Prices are then set to yield revenues that equal this revenue requirement.⁴

While the gas price in a GSPA is a negotiated term rather than a regulated one, the manner in which the government participates in the negotiation of gas price is quasi-regulatory.

The process of evaluating gas project costs culminates in Buyers and Sellers developing economic models that predict the costs and revenues over the life of the GSPA. To the extent the parties can agree on the cost inputs (and a reasonable rate of return), the gas price simply becomes the output of the parties' shared or "common" model. If not, each party may have its own separate model,

1. Jeffrey M. Petrash, *Long-Term Natural Gas Contracts: Dead, Dying, or Merely Resting?*, 27 ENERGY L.J. 545, 547-48 (2006).

2. VIVEK CHANDRA, FUNDAMENTALS OF NATURAL GAS: AN INTERNATIONAL PERSPECTIVE 112 (PennWell Books, 2006) (2006).

3. M NGOC, BP REACHING FOR TARGET, VIETNAM INVESTMENT REV. (JAN. 5, 2004)<http://www.vir.com.vn/Client/VIR/index.asp?url=content.asp&doc=2156> (last visited September 4, 2008)

4. Stephen Breyer, *Analyzing Regulatory Failure: Mismatches, Less Restrictive Alternatives, and Reform*, 92 HARV. L. REV. 549, 562 (1979).

with somewhat different assumptions, and these models may help the parties frame a negotiating range within which compromises and trades may occur.

A government gas buyer is rarely going to allow a foreign company to establish (or maintain) a gas price that extracts profits much higher than the returns projected in its model, at least for very long. In fact, the government's role as gas buyer helps it to capture any positive difference between the cost of the gas and its market value (to local industry). To the extent that the value of the gas exceeds the cost of service for the project, the government usually will view itself as the rightful beneficiary of any additional profits. This also is the case if circumstances become more favorable to the Seller over the life of the GSPA. For example, if the facilities survive longer than the amortized recovery period on which the gas price was originally based, the cost of service-per-unit of gas may decline. Whether the government captures such excess profits through renegotiation of the gas price, new taxes, or some other means, the benefit to the Seller will rarely last long.

On the other hand, what happens if the economics of a gas contract deteriorate through no fault of the Seller (or perhaps, even the Buyer), such as by virtue of a recession or other demand decline? What if a neighboring country discovers a large gas field that is cheaper to develop, causing industry to relocate to the cheaper gas source? What if alternative fuels become cheaper on a per-BTU basis, causing some customers to fuel shift? Although the Seller rarely receives enduring benefit from positive economic developments, it often bears the risk of negative ones.

Depending on the severity and duration of the economic change, the Seller and Buyer may be able to work together to restructure aspects of the project to reflect the new economic circumstances. For example, the Philippine government's:

efforts to provide a market that would encourage private development of the offshore Malampaya field included plans for several gas-fired IPPs [Independent Power Project] to purchase the gas. Contracts for these projects were signed in late 1997, just before the Asian financial crisis broke. As demand for power dipped between 1999-2002, the state utility Napocor found itself saddled with excess capacity just as 2,500 megawatts (MW) of new natural gas-fired electricity came online. The politics of fuel dovetailed with halting reform efforts to ensure that the costs for many of these projects fell directly on Napocor; the ensuing drain on Napocor's finances contributed to public and political dissatisfaction with the power sector,⁵ generally and exposed IPPs to public criticism and eventual renegotiation.

If the economic shock is large enough or long enough, or if the Seller's own debt and capital requirements are too closely tied to the price terms, renegotiation may not be possible. In 1995, CMS Gas Transportation purchased thirty percent of Transportadora de Gas del Norte ("TGN"), an Argentine gas transportation company.⁶ A component of the CMS and TGN agreements was a mechanism for increasing the TGN tariff in accordance with the United States

5. Erik J. Woodhouse, *The Obsolescing Bargain Redux? Foreign Investment in the Electric Power Sector in Developing Countries*, 38 N.Y.U. J. INT'L L. & POL. 121, 163 (2006) [hereinafter Woodhouse].

6. Harout Samra, *Five Years Later: The CMS Award Placed in the Context of the Argentine Financial Crisis and the ICSID Arbitration Boom*, 38 U. MIAMI INTER-AM. L. REV. 667, 681 (2006-7).

Producer Price Index. The escalation clause came under increasing pressure as Argentina's economy worsened, and mutually agreed suspensions of the escalation eventually gave way to unilateral restrictions by the government and finally, to arbitration by CMS.⁷ In its arbitration claim, CMS stated that its ability to repay the project debt had been substantially compromised by the government's failure to honor the adjustment clause and other provisions of its agreements.⁸

Similarly, in the Australian case of *Esso v. Plowman*⁹, Esso had gas price adjustment clauses in its contracts with two Australian utilities, Gas and Fuel Corporation of Victoria and the State Electricity Commission of Victoria.¹⁰ Pursuant to these provisions, Esso had the right to increase the gas price to account for certain changes in its cost of service, including those due to changes in taxes or royalties payable by Esso for the gas production.¹¹ After Esso was faced with higher taxes, it passed along these costs to its customers.¹² The utility gas buyers, however, refused to pay the escalated prices, leaving Esso to bear the higher taxes.¹³ This led to arbitration claims being filed by Esso.¹⁴

Even when the gas buyer is another private party, such as an independent power plant, the gas producer, or transporter may suffer as the backstop for economic losses. Independent power projects "are highly exposed to the vagaries of fuel markets" due to the fact that "the price of fuel is the principal cost component of electricity."¹⁵ Should the power plant be unable to pass along the costs of the delivered gas price to its electricity customers, the revenue stream for the gas seller will likely be disrupted. In a study of thirteen countries with independent power projects, the local fuel supply conditions were found to have "contributed significantly to project outcomes in eight of thirteen sample countries."¹⁶ In Brazil, "[t]he Brazilian power sector is dominated by hydroelectricity, which made new investment particularly difficult in gas-fired power plants because costly gas-fired electricity fared poorly compared to plentiful hydroelectricity in Brazil's marginal cost dispatch system."¹⁷ In contrast, low natural gas prices contributed to stability in Egypt notwithstanding a "macroeconomic shock - during 2001-02 [during which] the Egyptian pound fell to almost half of its original value and the dollar-denominated IPP contracts doubled in price (in local currency terms)."¹⁸ Such examples demonstrate how

7. *Id.* at 682.

8. *Id.* at 683.

9. *Esso Austl. Res., Ltd. v. Plowman* (1995) 183 C.L.R. 10.

10. *Id.* See also Gordon Smith & Meef Moh, *Confidentiality of Arbitrations - Singapore's Position Following the Recent Case of Myanma Yaung Chi Oo Co Ltd v. Win Win Nu*, 8 VINDOBONA J. INT'L COMM. L. & ARB. 37, 45 (2004).

11. *Esso*, 183 C.L.R. at 11.

12. *Id.* at 12.

13. *Id.* at 11.

14. *Id.* at 10.

15. *Woodhouse*, *supra* note 5, at 162.

16. *Id.*

17. *Id.* at 144.

18. *Id.* at 145.

the stability of a project can be impacted by relatively higher or lower delivered gas prices.

A key element to gas prices, and therefore stability, is quantity. How much gas will the Buyer need each day, and will that amount vary over the course of a month or year? In a perfect world, the Buyer will consume the same amount of gas every day of the year. In reality, Buyers often have varying needs. Sometimes this is a consequence of seasonal changes, the classic situation being that gas customers in a cold climate will consume more gas heating their homes in the winter than they will cooking in the summer. Similarly, in a hot climate gas-generated electricity demand will be highest on the hottest days, when air conditioners are running continuously.¹⁹

These types of situations create the potential for large amounts of “stand-by” capacity, which is only used on the coldest (or hottest) days of the year, but which increases the overall project costs (and the price of gas). Gas prices are usually calculated by dividing the cost of service by the quantity of gas that the Buyer is obligated to purchase. For example, if the cost of service for a facility that can deliver one million units of gas on a given day is one million dollars, and it is fully utilized, the cost per unit will be one dollar. On the other hand, if only 500,000 units of gas are purchased, the cost per unit will double. While this is a simple example, seasonal demands can vary on the order of two-to-one, and the ability of GSPAs to address this potential inefficiency is an important contributor to agreement efficiency and stability.

III. THE PROBLEM OF SEASONAL DEMAND AND ITS USUAL EXTERNAL SOLUTIONS

When the Seller is responsible for managing the Buyer’s seasonal capacity needs, it can be forced to reserve sufficient production, processing, and pipeline capacity for the Buyer’s peak demand, even if these facilities are only utilized on one day. This type of inefficiency is illustrated in Figure 1 below, which shows a hypothetical gas project with a peak demand of 300 mmscf/day (million standard cubic feet). The “Stranded Capacity” represents quantities that could have been produced and/or transported using the same facilities, thereby spreading the cost of the facilities across more gas molecules (and lowering the gas price).

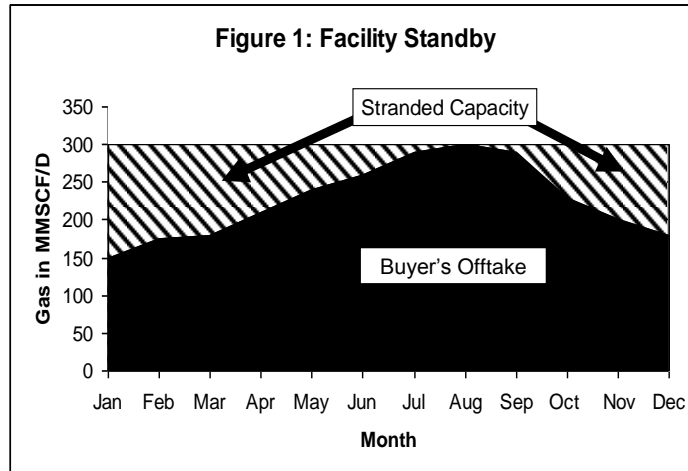
This is the dilemma that nations in the Middle East face. For example, in Dubai, United Arab Emirates, the average high temperature ranges from seventy-three degrees in January to 103 degrees in August.²⁰ Between these months, electricity demand more than doubles from the winter low of approximately 2300 MW and the summer peak of 4736 MW.²¹ Such dramatic demand

19. Niel King Jr. and Spencer Swartz, *Oil Exporters Are Unable to Keep Up with Demand*, WALL. ST. J., May 29, 2008, at A8.

20. The Weather Channel, *Monthly Averages for Dubai, United Arab Emirates*, http://www.weather.com/outlook/travel/businesstraveler/wxclimatology/monthly/graph/AEXX0004?from=month_bottomnav_business (last visited Sept. 4, 2008).

21. DUBAI ELECTRICITY & WATER AUTHORITY, SYSTEM PEAK DEMAND, <http://www.dewa.gov.ae/aboutus/electStats2007.asp> (last visited Sept. 4, 2008).

differences pose considerable challenges for the region's governments and its gas suppliers.



One of those gas suppliers is Dolphin Energy, which produces approximately two billion cubic feet of natural gas per day in Qatar and transports the gas across the Persian Gulf through a subsea pipeline to the United Arab Emirates, where the gas is sold to three government-owned customers: (1) Abu Dhabi Water & Electricity Company, an Abu Dhabi government entity that purchases an average volume of 929 mmscf/day; (2) Dubai Supply Authority, a Dubai government entity that purchases an average of 730 mmscf/day; and (3) Oman Oil Company, an Omani government entity that purchases an average of 200 mmscf/day.²² Most of this purchased gas is used by the respective governments for electricity production, which is subject to the large variances mentioned above.

Notwithstanding being faced with a seasonal demand variation similar to that in Figure 1, Dolphin Energy only reserves about seven percent of its capacity to meet its customers' "peak requirements."²³ Companies with such a challenge usually rely upon external solutions, such as counter-swing customers, peaking gas, and storage, which often require the cooperation of third parties.

A. Counter-Swing Customers

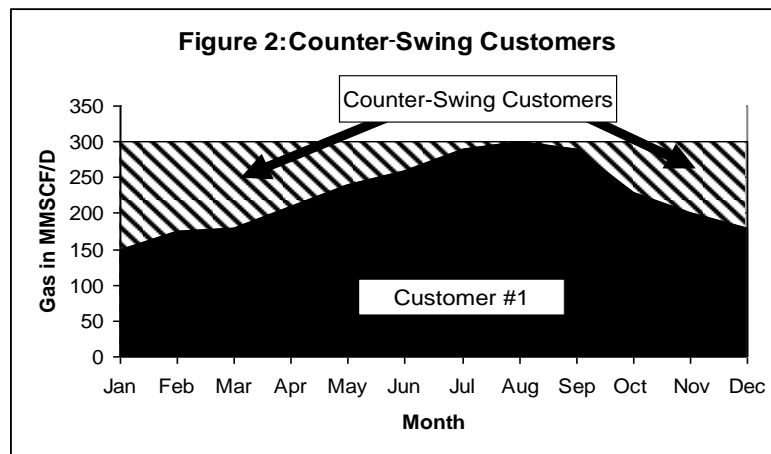
The ideal scenario for managing the Buyer's seasonal swing is to identify a second customer that can utilize the capacity when the first Buyer does not ("Counter-Swing Customer"). The Counter-Swing Customer may have gas needs that are inverse to the first Buyer's needs (*e.g.*, under-utilized Middle East winter production might be sold as liquefied natural gas (LNG) to Asia during its cold winter). Other times, a customer may be able to take gas whenever it is

22. DOLPHIN ENERGY, CORE CUSTOMERS AND VOLUMES (2007), <http://www.dolphinenergy.com/Public/marketing-distribution/marketing-natural-gas-customers-volumes.htm>.

23. *Id.*

available (e.g., oil fields that are in need of injection gas and industrial facilities with the capability to switch fuels and that usually burn more expensive liquid fuels).

Figure 2 illustrates how Counter-Swing Customers can manage seasonal swing. The Seller's facilities are optimized when gas is sold on a flat basis of 300 mmscf/d. The Seller's principal customer ("Customer #1") has a demand that ranges from 150 mmscf/d in January to 300 mmscf/d in August. The Counter Swing Customers purchase the difference between the 300 mmscf/d and Customer #1's actual gas consumption.



B. Peaking Gas from a Second Gas Source

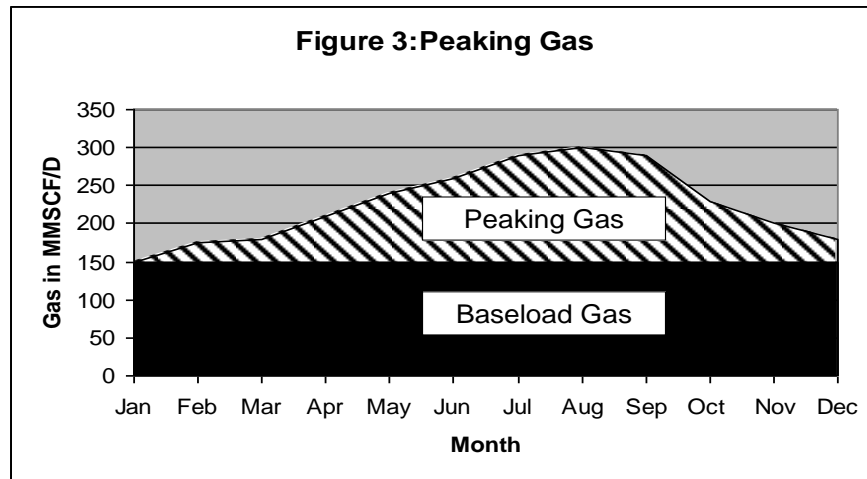
The Seller may also consider using peaking gas to manage the Buyer's seasonal swing. A peaking gas arrangement usually involves two GSPAs from two production sources, one with a flat, predictable offtake, and a second that manages the swing, the "Peaking GSPA". Figure 3 illustrates how peaking gas can be used to manage a Buyer's seasonal swing. The Seller produces 150 mmscf/d every day of the year, which represents the Buyer's minimum natural gas consumption in January ("Baseload Gas"). As the Buyer's gas consumption increases over the course of the year, the 150 mmscf/d of Baseload Gas is supplemented with gas purchased from a second source until the Buyer's gas consumption needs are met ("Peaking Gas").

Peaking gas sources include associated gas from crude oil fields and condensate stripping operations, which may have the ability to reinject gas that is not sold. In the United Arab Emirates, oil production has been negatively impacted by the practice of diverting gas from crude oil fields (gas is injected in oil fields "to boost reservoir pressure and increase crude recovery rates")²⁴ to electricity customers as peaking gas "during the summer, when governments scramble to keep the lights on and air conditioners cranking."²⁵ Peaking gas also

24. Neil King Jr. & Spencer Swartz, *Oil Exporters Are Unable to Keep Up with Demand*, WALL ST. J., May 29, 2008, at A8.

25. *Id.*

might be available from smaller, economically marginal gas fields that lack the capability to sustain customers on a long-term basis. If the Peaking GSPA is an obligation of the Seller, the additional costs of the Peaking GSPA are usually passed on to the Buyer. Alternatively, the Buyer may contract directly with the producer supplying the Peaking Gas.



C. Storage

Swing can also be efficiently managed with storage.²⁶ For example, the Seller might transport the same quantity of gas to the Buyer's geographic region each day. The Buyer consumes as much as it can, and the unconsumed quantities are injected into a depleted gas reservoir. These stored quantities are later withdrawn and consumed during the Buyer's peak period. In the United States, this use of storage capacity is common:

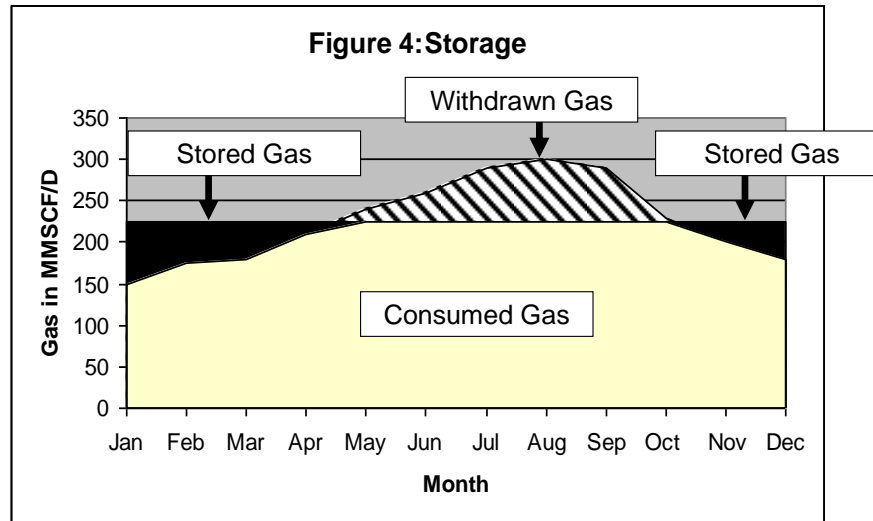
[S]torage can substitute for expanded delivery capacity upstream of the storage facility, effectively becoming part of the distribution system's peak-day delivery capacity. For instance, a distributor serving a market area with highly seasonal demand might receive a steady flow of gas year round, putting much of that flow during low-demand months into storage and then using storage withdrawals in combination with upstream supply to meet demand in peak months. By using storage this way, the distributor can purchase less peak-day pipeline delivery capacity to bring gas to the distribution system. In this case, storage serves as part of the distribution system's peak-day delivery capacity.²⁷

Figure 4 illustrates the use of storage to manage seasonal swing. The Seller produces a flat quantity of 225 mmscf/d every day of the year. During the winter period, the Buyer's needs are less than 225 mmscf/d. The difference between the Buyer's actual daily gas consumption and the 225 mmscf/d of production is delivered into storage ("Stored Gas"). When the Buyer's demand exceeds the

26. Dr. Jeffrey J. Leitzinger & Steve Ostrover, *What Can We Expect From Restructuring in Natural Gas Distribution?*, 21 ENERGY L.J. 51, 55 (2000) [hereinafter *Leitzinger*].

27. *Id.* at 55.

Seller's production of 225 mmscf/d, the Seller withdraws stored quantities to meet the Buyer's needs ("Withdrawn Gas"), which is also consumed.²⁸



IV. USING QUANTITY TERMS TO MANAGE SEASONAL SWING INTERNALLY

In addition to the external solutions described above, it also is possible to design the contractual terms of the principal GSPA in a manner that mitigates the counter-swing, peaking or storage quantities required, or that reduces the amount of capacity that needs to be reserved. While the overriding goal for the selection of quantity provisions in a GSPA should be to meet the Buyer's demand needs as narrowly as possible, this can be difficult to achieve in a country with a developing gas market. There may be only one gas producer, and/or only one gas buyer. Even if there is more than one producer, the other producers' gas supplies may be committed to other customers, and therefore not realistically available. In a developing gas market, the limited availability of counter-swing customers, peaking gas suppliers, or gas storage facilities increases the likelihood of construction of excess project capacity and higher gas prices.

As previously discussed, just because the Buyer is willing to pay a higher gas price does not mean this is in the long-term best interest of the Seller. The Seller's ability to recover its costs and rate of return over twenty to thirty years requires contractual stability. The difference between a narrowly tailored gas price and one inflated with excess capacity could affect the country's growth rate or its ability to compete with its neighbors, or simply make the contract's terms more vulnerable to normal economic cycles. This section provides an overview of the quantity terms associated with the Seller's delivery obligation and the Buyer's purchase obligation and then explains how these terms can be adjusted in ways to minimize excess capacity, thereby improving the efficiency and stability of GSPAs.

28. *Id.* at 56. (Of course, the storage process involves additional costs, such as injection wells, compression and reprocessing. These costs can be paid directly by the Buyer to the storage facility or be included in a bundled gas price.)

A. Quantity Terms Associated with the Seller's Obligation to Deliver Gas

1. Annual Contract Quantity

GSPA quantity negotiations typically commence with an analysis of how much gas the Buyer will need on an annual basis.²⁹ The Annual Contract Quantity (ACQ) is the Buyer's annual entitlement to gas, or to put it another way, the maximum quantity of gas that the Buyer has a right to take during a year. The ACQ is usually expressed as a firm annual number in standard cubic feet ("mmscf") or British Thermal Units (BTUs).³⁰ Over the course of the GSPA, the Seller may agree to deliver quantities in excess of the ACQ, but it has no contractual obligation to do so. As such, the Buyer will want to ensure that the ACQ is sufficient to meet its realistic demand expectations over the course of the GSPA.

A GSPA may have one ACQ that applies to every year of the contract, or it may provide for different ACQs in different years. For example, if a Buyer's electricity market is growing, it might seek to escalate the ACQ over time, reflecting expectations of increasing gas consumption by its power plants. Such a phased approach could call for facility additions over time, which costs would only be factored into the gas price in the later years. Since these capital expenditures are delayed, the increase in the ACQ, and the construction of the additional facilities, can be an option for the Buyer.³¹

2. Daily Contract Quantity

Once the parties are comfortable with how much gas the Buyer needs on an annual basis, the next question is usually how much it needs on a daily basis. The Daily Contract Quantity (DCQ) represents the typical, or average, amount of gas that the Buyer expects to purchase on a given day under the GSPA.³² If the Buyer expects to purchase the same quantity every day of the year, the DCQ is usually expressed as the ACQ divided by 365.³³ In a situation of seasonally

29. Stephen Adekunle Adegun, *Take or Pay Contracts as Investment Drivers for Gas Development Projects in Developing Countries: Are There Co Pilots?* 4, THE CENTRE FOR ENERGY, PETROLEUM AND MINERAL LAW AND POLICY, February 20, 2007, http://www.dundee.ac.uk/cepmlp/car/html/CAR10_ARTICLE4.PDF.

30. Standard Cubic Feet is a volumetric measurement for natural gas whereas British Thermal Units is a measure of its heating capacity. "For pure natural gas, which is 100 percent methane, one MMBTU equals one MCF at standard atmospheric conditions." Joseph H. Fields, *Purchasing Natural Gas and Electricity from Nonutility Suppliers*, 78 MICH. BAR J. 174, 175 (1999) [hereinafter *Fields*].

31. The ACQ might also decrease over time if the Buyer expects to replace less efficient facilities with more efficient facilities, or if the Seller anticipates that its gas production will decline over time. In such cases, the parties to the GSPA may wish to set forth the ACQ's for each year in an appendix.

32. Adegun, *supra* note 29 at 7.

33. It is not always possible for the Seller to know what quantities it will produce over the term of a GSPA. This can be the case with an associated gas field, where the quantity of gas is tied to crude oil production. Production uncertainty can also result from reservoir depletion. In such cases, the GSPA can address the Seller's risk of committing to more gas than it may eventually be able to deliver by allowing the Seller to specify its available quantities on a rolling basis (Seller Nominated GSPA). Under a Seller Nominated GSPA, the DCQ is nominated a day or more in advance by the Seller as the quantity that it is capable of delivering on that day. The ACQ under a Seller Nominated GSPA is calculated by summing the Seller's specified DCQs. See e.g. SUMMARY INFORMATION MEMORANDUM, E.ON RUHRGAS GAS RELEASE

changing demand it is possible for the Buyer's DCQ to vary over the course of a year. The GSPA typically addresses this problem by forecasting the Buyer's average gas consumption for each month and then specifying these figures as monthly DCQs in an appendix.³⁴

3. Maximum Daily Quantity

The Maximum Daily Quantity (MDQ) is the daily equivalent of the ACQ.³⁵ It represents the maximum quantity that the Buyer has a right to take, or have delivered, during a given day.³⁶ While the Seller may agree, at its discretion, to deliver quantities in excess of the MDQ, the Seller usually has no obligation to do so.³⁷ The MDQ is expressed as a percentage (typically 105 percent to 120 percent) of the DCQ. If the DCQ is the same throughout the year, the MDQ usually will be the same every day; if the DCQ varies, the MDQ percentage is likely to vary, as well.

4. Additional Gas

One risk that the Buyer may wish to address in the GSPA is the possibility of exhausting the ACQ before the end of the year. The GSPA may provide for the Buyer's right to request quantities above the ACQ ("Additional Gas" or "Excess Gas") and specify the price that the Buyer will need to pay if the Seller agrees to provide the Additional Gas (typically 105 percent to 130 percent of the ACQ gas price).³⁸ While the Seller is under no obligation to provide Additional Gas, the negotiated price premium provides the Buyer with an incentive to do so. Including such a term in a GSPA may provide the Buyer with some comfort that the Seller will at least use its reasonable commercial efforts to supply additional volumes in the event that demand forecasts used to establish the ACQ fall short in a future year.

5. Bank Gas

An alternative to Additional Gas (which is only sold to the Buyer at the Seller's discretion) is a firm commitment from the Seller to provide certain quantities of gas above the ACQ ("Bank Gas"). Under such an arrangement,

PROGRAMME 2007 (February 15, 2007), http://www.eon-ruhrgas.com/cps/rde/xber/SID-3F57EEF5-093DEFA0/er-corporate/SIM_2007_en.pdf.

34. Ferdinand E. Banks, *An Introduction to the Economics of Natural Gas*, 27 OPEC REVIEW 25, 34 (2003). If the GSPA utilizes varying ACQs, variations in DCQ will need to be captured formulaically with what are called "Monthly Swing Ratios." Monthly Swing Ratios represent the percentage of the ACQ that will be consumed in a given month. For example, if the Swing Ratio for a month is .1, it means that ten percent of the ACQ will be allocated to that month. The DCQ is then calculated by dividing the product of the Swing Ratio and the ACQ by the number of days in the month.

35. *Fields, supra* note 30, at 177-78.

36. *Id.*

37. *Id.* at 178.

38. ESKOM, GAS SALES AGREEMENT TERM SHEET, at 6 <http://www.eskom.co.za/content/12%20Gas%20Term%20Sheet%20with%20Lender%20and%20Sponsor%20omments.doc> (Last visited on Sept. 3, 2008). Additional Gas might also include gas quantities that exceed the Maximum Daily Quantity. If the issue of price is unaddressed in the GSPA, the Buyer may find itself paying an even higher premium for Additional Gas than it could have negotiated at the outset of the relationship.

should the Buyer exceed the ACQ, it would be entitled to call on, and the Seller would be obligated to deliver, specific quantities of up to x mmscf per year.³⁹ The GSPA can also provide for a right to Bank Gas on a specific day should the MDQ be exceeded. For example, the Buyer could be entitled to receive up to an additional ten mmscf per day in addition to the MDQ. In either case, there may be a price premium attached to Bank Gas. As described further below, the use of Bank Gas terms in GSPAs can often help the parties to tailor other quantity terms more narrowly, such as the MDQ, in situations of seasonally changing demand.

6. Total Contract Quantity

Total Contract Quantity is the Buyer's entitlement to gas over the entire life of the GSPA, that is, the maximum quantity that the Buyer has a right to take during the term of the GSPA.⁴⁰ The Total Contract Quantity usually represents the amount of gas that can be withdrawn from the reservoir before the Seller is uncertain of its capability to meet the ACQ and MDQ thresholds in the GSPA.⁴¹ Thus, although a Seller may be able to deliver Additional Gas, or Bank Gas, over the course of a GSPA, such deliveries may count against the Total Contract Quantity and shorten the term of the GSPA.

7. Liquidated Damages and Guaranteed Delivery Quantities

The consequences for the Seller's failure to deliver a quantity that a Buyer is entitled to receive vary greatly. The severity of the penalty for delivery failure also may dictate what flexibility a Seller is willing to agree upon with respect to such terms as the MDQ and Bank Gas. The greater the penalty for delivery failure, the more conservative the Seller is going to be with respect to its commitments.

Some GSPAs provide that the Seller's only penalty for a delivery failure is a reduction in the Buyer's obligation to purchase gas (the take or pay). More typically, a GSPA dictates a liquidated damages credit or payment, which is usually expressed as a percentage of the gas price (*e.g.*, thirty percent).⁴² For example, if the Seller failed to deliver 100 mmscf, the next 100 mmscf delivered to the Buyer would be subject to a thirty percent discount.

The Seller also will usually seek to negotiate limits on the amount of liquidated damages. One common term is a maximum liability cap, which limits the Seller's liquidated damages at a sum certain during any single year and over the entire term of the GSPA.⁴³ Liquidated damages provisions also may be limited to the positive difference, if any, between the Buyer's cost of

39. See Fields, *supra* note 31, at 178. The premium price for Bank Gas may be even higher than that for Additional Gas.

40. ESKOM, GAS SALES AGREEMENT TERM SHEET, at 5, <http://www.eskom.co.za/content/12%20Gas%20Term%20Sheet%20with%20Lender%20and%20Sponsor%20comments.doc> (Last visited on Sept. 3, 2008).

41. *Id.*

42. Chandra, *supra* note 2, at 114

43. ESKOM, GAS SALES AGREEMENT TERM SHEET, <http://www.eskom.co.za/content/12%20Gas%20Term%20Sheet%20with%20Lender%20and%20Sponsor%20comments.doc> (Last visited on Sept. 3, 2008).

replacement fuel and the gas price. This protects the Seller from the situation where the Buyer incurs little, or no, actual damages.

The quantity of the delivery failure can be factored into the liquidated damages calculation as well. For example, liquidated damages can be set at five percent of the gas price for any portion of a delivery failure of up to ten percent of the DCQ but then rise to thirty percent of the gas price for delivery failures of greater than ten percent of the DCQ. A variation of this approach is the exemption of minor shortfalls from liquidated damages altogether. This is usually accomplished by creating daily and annual "Guaranteed Delivery Quantities," which are less than the DCQ and ACQ, respectively. If the Guaranteed Delivery Quantities were ninety percent of the DCQ and ninety percent of the ACQ, the Seller would only incur liquidated damages if the quantities it made available for delivery failed to meet those somewhat lower thresholds. The controlling principle in the negotiation of any delivery failure provision is not making the Buyer whole but preventing the Seller from engaging in opportunism. The Buyer should consider whether the delivery failure mechanism is strong enough to discourage the Seller from selling the gas to another customer. Depending on the maturity of the gas market, this risk may be precluded altogether by geography or law (perhaps, for instance, there is no other entity to which the gas can be sold). It also may be useful for the GSPA to distinguish delivery failures that are intentional in nature, such as the Seller's decision to sell the gas to a different customer at a higher price.

Occasionally, the Buyer will seek "make whole" damages in the form of the cost differential for replacement fuel, or, if no replacement fuel is available, all damages it may suffer. As a general rule, the economics of a gas project cannot sustain the burden of insuring a Buyer's electricity or industrial businesses. If the gas processing plant is damaged, it may be months before gas deliveries can be resumed. To mitigate such risks, it is important for the Seller to place a quantitative limit (in the form of liquidated damages) on its worst case exposure under a GSPA.

B. Quantity Terms Associated with the Buyer's Obligation to Purchase Gas

Just as the Buyer needs to have its delivery rights guaranteed, the Seller must be guaranteed a minimum revenue stream, which is sufficient to pay for the costs of the project and to provide for a reasonable rate of return. GSPAs typically provide for daily, monthly, and/or annual thresholds, which establish minimum revenues for the Seller, irrespective of the Buyer's actual consumption. Unlike maximum quantity provisions, which can represent physical limitations on gas delivery, minimum quantities are principally economic in nature. Thus, while the Buyer can take anything between zero and the ACQ during a year, there are usually economic penalties for taking too little gas.

1. Annual Take or Pay Quantity

The key term for the Seller is the annual amount of gas that the Buyer must either take and pay for, or if it does not take, must pay for anyway. These are the same types of contractual provisions that were the subject of considerable

litigation in the United States between interstate gas pipelines and their gas suppliers.⁴⁴ The Fifth Circuit described the provisions as follows:

The purpose of the take-or-pay clause is to apportion the risks of natural gas production and sales between the buyer and seller. The seller bears the risk of production. To compensate seller for that risk, buyer agrees to take, or pay for if not taken, a minimum quantity of gas. The buyer bears the risk of market demand. The take-or-pay clause ensures that if the demand for gas goes down, seller will still receive the price for the Contract Quantity delivered each year.⁴⁵

Similarly, in an international GSPA, if, at the end of any contract year, the Buyer's offtake is less than the Annual Take or Pay Quantity, the Buyer must pay the gas price for the quantity shortfall as if it had been taken.⁴⁶ The Annual Take or Pay Quantity is usually expressed as a percentage of the ACQ, typically between eighty percent and ninety-five percent of the ACQ.

2. Daily Minimum Quantity and Monthly Take or Pay Quantity

Gas projects typically require a reasonably predictable and consistent cash flow over the course of the year, which is used to support financing obligations and/or upstream purchasing commitments. Other commercial arrangements, such as the sale of ethane, propane, butane, and/or condensate, may also be disrupted if the Buyer takes less gas than was expected on a given day or during a given month. These considerations usually lead the Seller to request a daily or monthly take or pay in addition to the Annual Take or Pay Quantity.

The daily take or pay, or "Daily Minimum Quantity", is the minimum quantity of gas (expressed as a percentage of the DCQ) that the Buyer must take each day. If, on any day, the Buyer's offtake is less than the Daily Minimum Quantity, the Buyer must then pay for the quantity shortfall as if it had been taken. Under this arrangement, the Buyer's monthly invoice assumes that the Buyer took the greater of its actual daily consumption or the Daily Minimum Quantity.

A monthly take or pay ("Monthly Take or Pay Quantity") is the minimum quantity of gas (expressed as a percentage of the sum of the DCQs for the month in question) that the Buyer must take each month. If, at the end of the month, the Buyer's total monthly offtake is less than the Monthly Take or Pay Quantity, the Buyer must then pay for the quantity shortfall as if it had been taken.

Whether or not a GSPA opts for the Daily Minimum Quantity approach or the Monthly Take or Pay Quantity depends principally on the Seller's situation.⁴⁷ If the Seller is only concerned about working capital and cash flow, the Monthly Take or Pay Quantity is usually sufficient. But, if the Seller is concerned about maintaining ethane flow to a petrochemical plant, it will opt for the Daily Minimum Quantity.

44. John Burritt McArthur, *The Take-or-Pay Crisis: Diagnosis, Treatment and Cure for Immorality in the Marketplace*, 22 N.M.L. REV. 353, at 355-56 (1992).

45. *Universal Resources Corp. v. Panhandle E. Pipe Line Co.*, 813 F.2d 77, 80 (5th Cir.1987).

46. STANDARD & POOR'S, INFRASTRUCTURE FINANCE: RAS LAFFAN LIQUIFIED NATURAL GAS CO. 5 (OCTOBER, 1999), http://siteresources.worldbank.org/PPPILP/Resources/S&PRas_Gas_October_1999.pdf.

47. The Buyer prefers the flexibility of the Monthly Take or Pay Quantity because the Buyer has the opportunity to balance one or two bad days over the course of a month.

Whichever approach is used, the parties must consider how it is integrated with the Annual Take or Pay Quantity. Is the Daily Minimum Quantity/Monthly Take or Pay Quantity based on the same percentage as the Annual Take or Pay Quantity, or a lower percentage? If the Buyer incurs payments for Daily Minimum Quantity/Monthly Take or Pay Quantity deficiencies but yet meets its Annual Take or Pay Quantity, does the Buyer get the earlier payments refunded? Answers to questions such as these again depend principally on the Seller's circumstances. Consider the case where any quantities not consumed by the Buyer are otherwise lost (*e.g.*, flared), or where the Seller incurs costs from reinjecting the gas back into the reservoir. This could be the case in an associated gas project or condensate stripping project, where maintaining liquids production is paramount. It might also be the case in a non-associated gas project where ethane is being sold to a petrochemical plant. In such circumstances, the opportunity for refund may be limited because the Seller has sustained an economic loss.⁴⁸

3. Deductions from the Take or Pay Quantity

Daily, monthly, or annual, take or pay obligations usually exclude any quantities that were subject to force majeure or that were not made available for delivery by the Seller (collectively, the deducted quantities are "D").⁴⁹ Negotiators should be aware, though, that how D is deducted can matter. One formulaic approach deducts D from the ACQ before multiplying the take or pay percentage; the second deducts D after multiplying the take or pay percentage:

- $(\text{TOP}\%) \times (\text{ACQ} - \text{D}) = \text{Annual Take or Pay Quantity}$ ("Seller-Favored Formula"); or
- $((\text{TOP}\%) \times (\text{ACQ})) - \text{D} = \text{Annual Take or Pay Quantity}$ ("Buyer-Favored Formula").

The significance of the difference is illustrated in the example below, which assumes an ACQ of 36,500 mmscf, a take or pay percentage of eighty-five percent of the ACQ and a value for D of 6,500 mmscf:

- $(.85) (36,500 - 6,500) = 25,500$ mmscf for the Annual Take or Pay Quantity
- $((.85) (36,500)) - 6,500 = 24,525$ mmscf for the Annual Take or Pay Quantity

As is evident from the example, it is in the Seller's interest to have quantities deducted first (to arrive at a higher Annual Take or Pay Quantity) and

48. When there is no opportunity for refund and the percentages are the same (*i.e.*, the Annual Take or Pay is eighty-five percent and the Daily Minimum Quantity or Monthly Take or Pay Quantity also is eight-five percent), the parties may dispense with the Annual Take or Pay Quantity, relying solely on the Daily Minimum Quantity or Monthly Take or Pay Quantity.

49. GUY HARDACKER, FORCE MAJEURE AND TAKE OR PAY CONTRACTS FOR POWER STATIONS: THE BUYER'S PERSPECTIVE (2000), <http://www.hfw.com/13/new/new13c002.html>.

in the Buyer's interest to have the deduction come last (to arrive at a lower Annual Take or Pay Quantity).

The impasse over which formula to use is usually resolved when one party trades the formula for a concession on some other provision. Occasionally, the parties adopt a blended formula that deducts force majeure quantities on the basis of the Seller-Favored Formula and delivery failure quantities using the Buyer-Favored Formula. This compromise is based on a distinction between delivery failures that are the responsibility of the Seller and those that are not (force majeure).

4. Make Up Gas

When a Buyer makes a Take or Pay Payment, it usually receives a credit, which it can apply to the following year's gas consumption ("Make Up Gas").⁵⁰ This credit can either be a quantity (*e.g.*, mmscf) or dollar value.⁵¹ If the Make Up Gas credit is expressed as a quantity, the Buyer can take that quantity in a future year without making any additional payments.⁵² If the Make Up Gas credit is expressed as a dollar balance, the Buyer can take a quantity equivalent in value to the dollar balance. The dollar balance approach is disadvantageous to the Buyer if the gas price increases over time because the Buyer will ultimately receive a smaller quantity of Make Up Gas than it initially paid for.

The Buyer's right to take its Make Up Gas also is subject to the other quantity provisions in the GSPA. First, the Buyer must meet the Take or Pay Quantity in a subsequent year. For example, if a Buyer has a balance of 100 mmscf in Make Up Gas from Year 1, and its Take or Pay Quantity in Year 2 is 30,000 mmscf, the Buyer will have to take and pay for 30,000 mmscf before it can receive the next 100 mmscf free as Make Up Gas. The Buyer's right to receive Make Up Gas is also subject to the MDQ and ACQ restrictions. For example, if the Buyer's MDQ was fifty mmscf, the Buyer could not nominate in excess of fifty mmscf on a particular day, irrespective of whether the nomination was regular gas or Make Up Gas or some mix of the two.⁵³

50. The Buyer usually would not be entitled to Make Up Gas in a situation where the gas that it failed to take was flared.

51. *Diamond Shamrock Exploration Co. v. Hodel*, 853 F.2d 1159, 1164 (5th Cir. 1988).

52. *Id.* at 1164.

53. A Buyer sometimes seeks to have a subsequent year's take or pay percentage reduced by the amount the Buyer exceeds the previous year's take or pay percentage (Carry Forward). ESKOM, GAS SALES AGREEMENT TERM SHEET, at 6, <http://www.eskom.co.za/content/12%20Gas%20Term%20Sheet%20with%20Lender%20and%20Sponsor%20comments.doc> (Last visited on Sept. 3, 2008). Posit a case where the Buyer's take or pay percentage is ninety percent of the ACQ. In Year 1, the Buyer takes and pays for 100 percent of the ACQ. The difference of ten percentage points (between what the Buyer took, 100 percent, and the take or pay percentage, ninety percent) is carried forward and deducted from the Year 2 take or pay percentage so that the Buyer's take or pay percentage in Year 2 is only eighty percent. While a Buyer may argue that a Seller is better off receiving 100 percent in Year 1 and eight percent in Year 2, as compared with ninety percent in each of the years, Sellers would rather have 100 percent in Year 1 and ninety percent in Year 2. A stable take or pay floor also encourages the Buyer to maintain a predictable offtake from year to year, which may provide important technical and commercial benefits to the Seller (*e.g.*, the ability to supply ethane to a petrochemical plant).

C. Tailoring Quantity Terms to Seasonal Swing

The starting point for the management of seasonal swing should be a thorough understanding of exactly what the variations in demand look like. This requires the Buyer to share with the Seller daily consumption history over many years, as well as any forecasts of future gas consumption. These can be used to build a profile of the Buyer's daily gas consumption ranges, including the peak maximum daily demand of the facility during each month.⁵⁴ It also is important to ascertain how many days in a month such peak demand was present. Was the peak present throughout the month, or was it the result of an unusual weather event that lasted only a few days? Once the Buyer and Seller can agree on the Buyer's specific needs, it is then easier to tailor the quantity terms in a way that meets the Buyer's needs as narrowly as possible.

1. Varying DCQs with Fixed MDQ Percentage

The first approach to manage the problem of seasonal swing more efficiently is to allow the DCQ and MDQ to track the monthly peak usage data. Under this approach, a different DCQ is calculated for each month, reflecting the average gas consumption for a month. For example, the DCQ in January would be the forecast of the Buyer's average January gas consumption; the DCQ in July would be the forecast of the Buyer's average July gas consumption. Because the MDQ is calculated as a percentage of the DCQ, the MDQ would track the Buyer's DCQ.

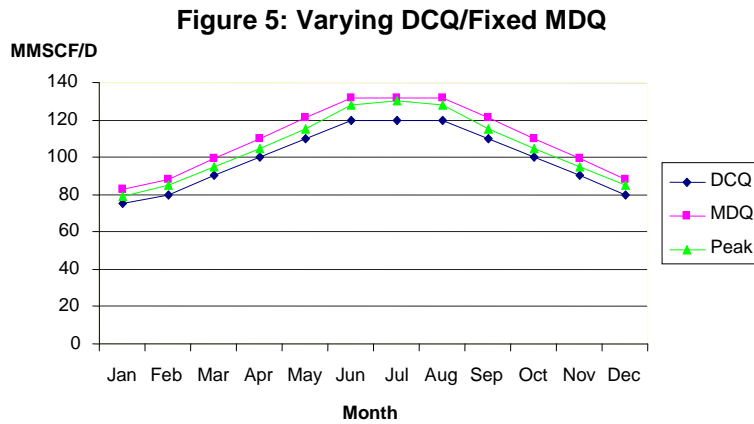
In Figure 5, the parties have estimated the average daily gas consumption for each month of the year, which ranges from seventy-five mmscf/d in January to 120 mmscf/d in July. By varying the DCQ, the Buyer's peak daily needs during each month are met with an MDQ percentage of 110 percent.⁵⁵

Figure 5 also demonstrates the principal advantage of varying the DCQ from month to month. If the Seller had an MDQ of 130 mmscf/d every month of the contract, it would be required to stand ready to deliver such quantity every month of the year. The ability of the Seller to reduce its January MDQ commitment from 130 mmscf to eighty-three mmscf enables the Seller, for example, to make a firm commitment to a counter-swing customer to deliver forty-seven mmscf/d in January (and smaller amounts in other months).

A similar approach also should be applied to any Daily Minimum Quantity or Monthly Take or Pay Quantity. By specifying in the GSPA that these terms are no lower than the Buyer's lowest historic gas consumption in a particular month, it will enable the Seller to rely upon a minimum daily or monthly revenue stream in each month. This could assist the Seller in its efforts to sell more ethane or condensate on a long-term basis, obtain financing or better manage its project working capital.

54. In the absence of historical data or reliable forecasts, the parties might also look at publicly available government figures regarding energy consumption or even historical weather data, either of which could be a proxy for the extent of the demand swing that a facility might experience.

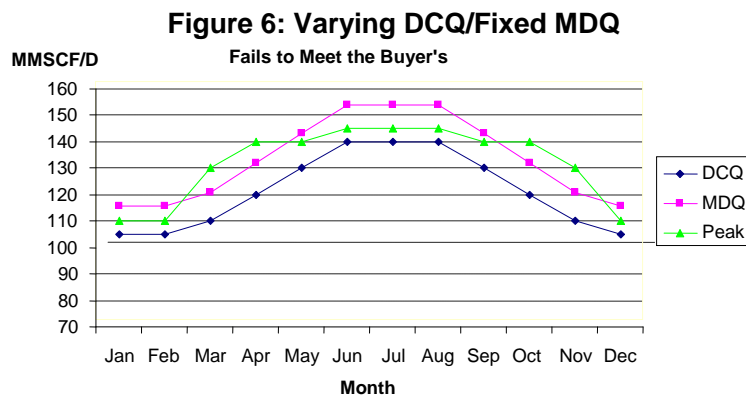
55. The Seller needs to take care that the MDQs in the higher gas consumption months do not exceed its production, processing or pipeline capacity. If such a limitation applies, the definition of the MDQ should be modified to reflect the limit. This can be accomplished by stating in the MDQ definition that the MDQ will be the *lesser* of *y* percent or *x* mmscf.



2. Varying DCQs with Varying MDQ Percentages

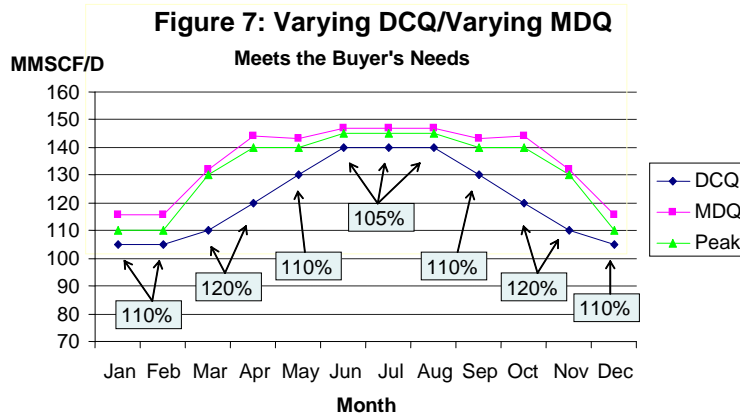
The Varying DCQ/Fixed MDQ approach works best when the Buyer's daily peak during each month is a similar percentage above the respective monthly DCQs. The approach fails, however, when the daily peak represents a larger percentage of the monthly average in some months as compared to others. This is a common problem where seasons change quickly, leading to extreme demand variations in some months but relative stability in others.

Figure 6 illustrates this problem. It shows a varying DCQ with a fixed MDQ percentage of 110 percent of the DCQ. Due to changing seasons, however, the MDQ of 110 percent is too low for the Buyer during the shoulder months of March, April, October, and November. It is also probably a bit too high for the Seller during the stable months of June, July, and August.



The solution to such a demand profile is to increase the MDQ percentage during the months of April, May, October, and November and to decrease the

MDQ percentage during the months of June, July, and August. Figure 7 illustrates this approach. The result is an MDQ percentage that varies by month in accordance with the Buyer's needs: 105 percent in June, July, and August; 110 percent in January, February, May, September, and December; and 120 percent in March, April, October, and November. The lower MDQ of 105 percent in August enables a five percent reduction in the peak capacity of the Seller's facilities, which will likely lower the gas price.



3. Quantity Bank Day MDQ

When the Buyer's peak daily demand in any month is significantly higher than its average daily consumption, this usually means that the Buyer will only need to call on the peak quantity a few times during the month. In such cases, it is useful to look at the frequency with which the Buyer's daily demand will exceed certain thresholds (such as 105 percent, 110 percent, 115 percent, and 120 percent of the monthly average). Using the example from Figures 6 and 7, consider the case where the Buyer's historical data from the shoulder months indicated that there were a maximum of two days in March, three days in April, four days in October, and two days in November that a MDQ of higher than 110 percent would be needed.⁵⁶ Rather than providing the Buyer with a MDQ of 120 percent on each day of the month – when it only needs it on a handful of days – the parties can agree to limit the number of days in a month that are eligible for the higher MDQ.

The solution is a variation of the Bank Gas concept and is called a "Quantity Bank." The Quantity Bank provides the Buyer with the right to take gas above the 110 percent MDQ, up to a higher threshold of 120 percent ("Quantity Bank Day MDQ"), but during no more than five days per month.⁵⁷ In the case above, the Buyer would be granted any five days in April during which it could elect a Quantity Bank Day MDQ, and, on those days, the higher Quantity Bank Day MDQ of 120 percent would apply instead of the lower MDQ

56. Shoulder months may be subject to weather events that bring unusually warm or unusually cool weather but only for a few days.

57. A further refinement to the Quantity Bank would be to specify different numbers of days for each of the months (*e.g.*, March – two, April – three, October – four, and November – two).

of 110 percent. In this way, the Buyer is guaranteed that its needs are met without giving it the right to call upon gas quantities that it does not need.

While the Seller continues to have some uncertainty regarding the maximum quantity of gas that will flow to the Buyer on any given day in April (it could be either 110 percent of the DCQ or 120 percent of the DCQ, depending on the Buyer's election), the Quantity Bank places a firm monthly limit on the maximum total quantity of gas that will flow to the Buyer. The amount of capacity freed by a Quantity Bank can be substantial. In the four months considered above, the Seller decreased its total annual commitment for deliveries above 110 percent of the DCQ from about 1.4 billion cubic feet (bcf) to 230 mmscf.

This reduction in monthly commitment can significantly ease the burden of seasonal swing. For instance, the Seller might contract with a third party for an option to purchase up to 230 mmscf during the course of the year. Or it could simply place 230 mmscf of gas in storage. Either of which is easier and less expensive than the 1.4 bcf commitment that would be required in the absence of a Quantity Bank.

Finally, the Seller might even be able to manage the Quantity Bank through the inherent storage capacity in the length of its pipeline (*i.e.*, line pack).

Another source of operational flexibility that the pipeline-as-merchant has used in the past to handle weather-related swings in demand is line pack. The amount of flexibility provided by line pack can be substantial. For example, a one-thousand-mile segment of 30-inch pipeline operating at 600 pounds per square inch contains approximately 1.14 Bcf of gas. If the pressure in the line is raised to 1,000 pounds per square inch, approximately 800 million cubic feet *more* gas can be effectively "stored" in the pipeline itself, and can be delivered simply by allowing customers to take gas out of the system faster than it is pumped into the system, thereby bleeding down the pressure and "delivering" the gas out of "storage."⁵⁸

Thus, the use of a Quantity Bank could enable the Seller to utilize its production capacity as if the Quantity Bank Day MDQ did not exist and entirely avoid the complexity of counter-swing customers, peaking gas, or storage, none of which may exist in a developing gas market.

V. CONCLUSION

International GSPAs enable producers to develop remote gas fields and sell the production to developing nations, which in turn convert the resource into electricity and industry. The long-term, bilateral guarantees of supply and purchase enable both parties to make substantial investments in long-life facilities, each of which is often dependent on the other. The higher the gas price the more likely it is that some set of future economic circumstances will place the Seller's revenue and/or the Buyer's facilities under stress. This is

58. Philip M. Marston, *Pipeline Restructuring: The Future of Open-Access Transportation*, 12 ENERGY L.J. 53, 69 (1991) (Internal citations omitted). Line pack regards how gas projects typically manage fluctuations within a twenty-four hour period, which is also called "Hourly Swing." Posit a situation where a power plant uses more gas during the daylight hours and less gas at night. During the night, the Seller injects more gas than the power plant withdraws, effectively filling up or "packing" the pipeline. *Id.* When daylight arrives, the power plant can consume not only the Seller's current production but also the unconsumed overnight gas that is in the pipeline. (Internal citations omitted).

particularly true in our current global economy, where the industry and production of one nation competes against many others.

Gas price usually reflects the Seller's facility costs, which are in turn designed to meet the contractual quantity obligations set forth in the GSPA. Thus, poorly designed GSPA quantity obligations tend to cascade into unnecessary gas facilities and higher gas prices. Perhaps the most difficult quantity design challenge arises when the Buyer demands significant seasonal swing. Parties facing seasonal variation should carefully quantify the Buyer's maximum gas needs and then cooperate to structure a package of contractual terms that meets those needs as narrowly as possible, utilizing both external options, if available (such as counter-swing customers, peaking gas and storage), and internal options (such as varying DCQs/MDQs and Quantity Bank Day MDQs). In doing so, the expenditure required for the same economic production is generally decreased, which fosters contractual stability by making the gas stream, and the economies that rely upon it more competitive in the global arena.