

# The Birth of a Spot Market in Australia's Natural Gas Industry

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## A) Introduction

Today Australia's natural gas industry has significant domestic demand and exports, an impressive portfolio of developed producing supply, and a high grade resource base by world standards, but no gas "market" yet exists. A fundamental characteristic of any commodity market is the existence of a vibrant spot market. It is difficult to imagine an open market or free and fair trade in Australia for natural gas while such a spot gas market is absent. The reform sweeping Australia's electricity industry has focused, among other things, on the establishment of a healthy spot market.

Australia's gas industry is relatively young and remains immature and

unsophisticated in comparison to those gas industries located overseas which have commoditised gas and in some cases also many of the associated activities such as transportation. While the genesis of the gas industry of Australia is fairly similar to that of most countries or continents, as the case may be, with long term take-or-pay supply contracts between reputable companies and market development franchises underwriting the capital expenditures associated with gas supply development, pipeline and distribution infrastructure construction, and the conversion to natural gas from other energy sources. In some cases the genesis also involved a new gas feedstock business such as a fertilizer or gas fired power plant as an anchor demand load.

While such arrangements were deemed necessary to initiate a gas industry the longer term result is a plateauing of demand, a thin industry, blackbox pricing, and the stifling of investment in the industry, large barriers to entry, cross subsidisations, and many more impediments to the development of a market for gas. In Australia this situation has been exacerbated by the general lack of interstate trade in gas. The interconnection of each states supply and demand via a gas pipeline grid is one of the many prerequisites for the development of a gas market in Australia. By most performance indicators the gas industry of Australia is grossly inefficient in comparison to worlds best practice. Given its resource position, Australia has the potential to enjoy the benefits of much lower delivered prices to consumers and a much larger robust industry while maintaining healthy upstream, midstream, and downstream sectors.

While I believe that Australia has much potential opportunities associated with its gas industry, such opportunity will only be fully realised if and when a competitive market emerges. The recent privatisation results surrounding Victoria's electricity industry illustrates the aggressive positioning of private companies when there is a high degree of confidence in the market structure of any given commodity. Such confidence has also been displayed historically by those involved in the many commodities which are openly traded on the world market such as oil, copper, ammonia, cotton, etc. While companies involved in such commodities may not like the prices from time to time, they all take great comfort in price discovery, liquidity, contracting efficiency, futures, financial risk management options, etc inherent with a working market. The establishment of a spot gas market in Australia is one of the basic building blocks toward such a gas market. Protectionism leads to lazy inefficient industries while competitive open markets lead to sustained health and growth.

## B) Spot Market - General

This paper will generally focus on the spot trading of pipeline gas (as opposed to liquified natural gas) in the physical cash market as opposed to the financial or paper market, for the physical spot market always preceeds a paper market. The New York Mercantile Exchange defines a spot market as follows: *Term which describes a one-time open market cash transaction, where a commodity is purchased 'on the spot' at current market rates. Spot transactions are in contrast to term sales, which specify a steady supply of product over a period of time.* The distinction between term and spot sales durations are commodity specific and for gas is rather grey due to the operational procedures of pipelines and to the historical long term nature of contracting. Spot transactions for gas must be of sufficiently short term time interval in order to generate meaningful price discovery. This has ranged from four hours to thirty days for gas depending on the market structure. The minimum term is dictated by the nomination procedures of pipelines serving any particular region. Victoria has proposed a one day spot trading period for the proposed gross pool gas market.

For commodities such as gas and electricity the geographic location of such trades is paramount due to the fact that neither commodity can be easily transported or stored. Although pipeline gas can easily be a homogenous product, transportation and storage constraints accentuate the physical attributes of the gas industry compared to such commodities as money, oil, and coal. Futhermore meaningful price discovery means spot transactions must have terms and conditions of trade which are fairly uniform. Spot prices are most reliable if spot contracts are standardised. Otherwise spot deals will vary in such price sensitive areas as obligation to perform - reasonable efforts, best efforts, interruptible, firm, or variations.

A spot market can involve transactions associated with either the primary or secondary markets. Until such time as long term vesting contracts either expire or are terminated, spot trading will be along the fringes of the primary market and concentrated in the secondary market. Spot trading in the secondary market will be encouraged by a demand / commodity pricing structure in the industry. Under such a pricing structure fixed costs are separated from variable costs and consequently a spot market under such conditions will reflect short run marginal costs. Since industry participants, particularly end users, may not be comfortable with a spot market a secondary driven spot market is slow to develop. Large scale industry discontinuities such as the FERC orders in the U.S. or the proposed mandatory gross gas pool for the state of Victoria are often necessary to kick start a spot market.

The genesis of a spot market for any continental pipeline gas market is usually in the wholesale sector as opposed to the retail sector, in those regions where gas supplies are in close proximity to large demand centres, and in the secondary market as opposed to the primary. Once established it spreads to other more distant regions, to the retail sector, and the primary market. The aforementioned simply describes the path of least resistance if market forces are not overcome by regulation or a major market discontinuity.

### C) The Value Which A Spot Gas Market May Offer

A healthy market is characterised by the easy entry and exit of buyers and sellers. Long term contracts with rudimentary risk sharing and risk allocation provisions create tremendous barriers to entry, as exists in Australia's current gas industry. Such trade barriers frustrate new entrants as there is no hope of even discounting to purchase market share since they are at the full mercy of the incumbents and their contracting arrangements. A spot market essentially provides a clearinghouse role. Such a clearinghouse is an efficient mechanism for the closing or settlement of contractual obligations, be they financial, commodity trading, or transportation services. In North America the spot price is extensively used to quickly settle temporary defaults in transportation balancing and supply or delivery firm obligations. "Spot markets are a normal mechanism by which commodity traders reconcile imbalances of supply and demand when, as, and if they occur. For example, spot markets in crude oil, petroleum products, and coal are generally within the range of 15 percent to 30 percent of overall consumption".<sup>1</sup> As the gas market of Australia becomes increasingly competitive the value of various positions will change more rapidly than in the past, thereby favoring shorter term arrangements. A portfolio of contracting arrangements which include a sizeable portion of spot enables adequate levels of both liquidity and stability in any given market.

A second need which a spot market satisfies is an efficient price discovery mechanism. A market must have a physical cash component from which floating or market prices are confidently derived. Furthermore, buyers and sellers in the brave new world of a competitive gas market will need current gas pricing information at various locations along the value chain in order to adequately inform themselves regarding the economics of each decision facing them. Inter-regional price relationships develop and regional pricing inefficiencies tend to evaporate

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<sup>1</sup> *Commoditization of North American Gas Markets: Trading Gas - Trading Capacity* paper by Benjamin Schlesinger and Associates, Inc; Executive Enterprises Inc. Natural Gas Futures Conference, September 20, 1993, Houston Texas, page 4.

given a robust spot market. Any given spot market, in order to confidently discover the market price, must have sufficient depth in terms of number of transactions and participants and must be of sufficient size to not be overly influenced by the actions of any given participant. Such price discovery allows for the confident correlation of various regional spot markets or as is the case in North America - gas hub indices. In the brave new competitive world any given market participant is unlikely to survive very long to the extent that the price of gas is either above or below the market for any sustained period of time. As hedging simply transfers risk, short term forward markets will simply eliminate price shocks associated with price volatility.

Upon sufficient confidence by financial institutions in such price discovery and liquidity, a futures market may or may not develop pending the volatility exhibited by any given commodity and the size of the market. It is interesting to note that gas has been the most volatile commodity introduced on NYMEX prior to electricity. Furthermore, there is a great deal of pricing flexibility and price efficiency when sales and purchases associated with a physical portion of a commodity market are indexed to a liquid underlying hedge index. The ultimate power of this structure is provided by the ability of either counter party to freely fix, float, or adjust its pricing structure in a number of other ways independent of each other. In other words, transactions become highly efficient due to wider contestability of many more components of each gas deal.

An economically efficient and competitive market is characterised by a spectrum of diverse contracting arrangements and the efficient management of risks associated with physical delivery of the commodity and price.

*Efficient management of risk, including risk due to price volatility, is one of the functions that competitive markets perform well. In a highly evolved commodity market, there will exist a diversity of contractual forms and options, which permit the risk of price volatility to be transferred to those parties who can bear the risk most efficiently. This diversity of contractual forms is absolutely necessary for market participants to be able to hold portfolios of supply options that yield a better combination of risks and prices than can be achieved through sole reliance on spot pricing<sup>2</sup>*

While this study was performed to examine the dangers of the dominant U.S. spot market, a sole reliance on long term contracts with escalated pricing and

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<sup>2</sup> *Oversight of Regulated Utilities' Fuel Supply Contracts: Achieving Maximum Benefit From Competitive Natural Gas and Emission Allowance Markets*, by Adam B. Jaffe and Joseph P. Kalt of The Economics Resource Group, April 1993, page i.

infrequent price reopeners is, in my opinion, an even more dangerous situation. Until a paper market exists for gas, market participants will have to manage risks either internally through vertical or horizontal integration or commercially by pursuing a portfolio of contractual terms which diversify its mix of price and supply reliability.

A spot market has the potential to substantially minimise transaction costs to the industry. This, however, may not be realized immediately since like many good things there may be some short term pain prior to longer term gains. The transaction costs are linked to such other factors as the synchronisation of the necessary gas transportation arrangements.

## D) Major Factors Effecting A Spot Gas Market

Many factors can impact on the spot gas market, some of which are common with other commodities and others which are more unique to natural gas. Another variable is the spot market structure adopted; to be discussed in the following section. It is important to remember that prices at any given time will reflect market behavior and not necessarily economic theory or rational behavior.

Assuming that a spot market is sufficiently deep and competitive, a large factor will be the size of the spot market relative to the total market and the spontaneous balance of supply and demand at any given trading point. During periods of under supply, spot prices will be generally capped by the short run market bearable prices of the last unit of demand served after others either switched fuels or suspended operations. During periods of over supply, spot prices will tend to fall to short run marginal costs. On average the prices received by the upstream industry from all sales, including spot, over the long term will need to be sufficient to encourage adequate levels of re-investment in that sector or supply will increasingly tighten due to ever increasing shortages and spot prices increase accordingly. A trend of increasing spot prices will place upward pressures on longer term pricing including the futures market and re-investment will follow - hence the typical commodity pricing cycle.

While such pricing signals are somewhat volatile, they are required in order to send the correct signals to the various industry participants. Spot gas prices tend to be more volatile than the more easily transported and stored commodities such as oil, coal, LPG, etc. Gas supply variables include the following: working gas in underground storage and the capacity to withdraw gas, pipeline balancing rules and the use of line pack, pipeline capacity and outages, gas processing plant capacity

and outages, and the degree of flexibility and dispatching under longer term supply arrangements. Gas demand variables which influence price include the following: capacity to inject gas into underground storage, pipeline capacity and outages, fuel switchability, weather, demand outages, and the flexibility afforded by firmer supply obligations.

## E) Various Spot Market Structures

### **The Traditional Model (North American Genesis)**

At least two separate and distinct mainstream models exist for the establishment of a competitive spot market structure and each has a unique set of operational and commercial considerations. What is often referred to as the more traditional model was perfected in what is now the super competitive gas market which covers Canada and the lower 48 states of the U.S. This model is based on the strict regulation of both transmission and distribution infrastructure, a ring fencing of businesses within vertically integrated companies, the unbundling of the commodity or the gas molecule from all other services, open competition in the trade of gas, transportation, financial derivatives, storage, etc as commodities, and open access and non-discriminatory behavior regarding the offering of infrastructure related services. Trade is based on the public outcry system patterned after the stock market and all buyers and sellers are free to contract for whatever level of services throughout the value chain deemed sufficient to conduct the business of their choice and each party bears the full consequences of such decisions.

Consequently a deep market of bilateral arrangements characterises the spot gas market under such a structure. The posted index at any one of many gas trading hubs is the price that according to an independent party best represents where the majority of spot market trading occurred during the bidding period of interest. The majority of spot trades are based on a monthly period and the famous bid week ritual occurs prior to each month, thereby establishing the index for the prompt month. All remaining contractual arrangements referencing the posted index for a particular trading hub as either a bid or offer price would then be established for the month. Furthermore, the index established at the Henry Hub, the delivery point for the NYMEX, would set the cash price for the closing of all NYMEX gas futures contracts. The relationship between this cash price and futures price is referred to as price basis risk by participants of the futures market.

It is important to note that there exists two commonly used methods of determining the index in the North American spot gas market. While most publications of index

prices use the mean or weighted average cost of all reported gas trades, one substantial publication uses the mode of the distribution curve. Since natural gas trades are not random events, the mean and the mode will not necessarily be the same.

Proponents of this model for the determination of spot prices are strong believers in its inherent competitiveness and individual freedom to take and manage risks. Such supporters argue that this model truly captures the essence of free and fair trade and the spirit of entrepreneurialism in gas commodity trading while curtailing if not eliminating any rents associated with monopolies.

### **The Pool Model (U.K. Genesis)**

The second most popular market structure which not only fosters a spot market but indeed forces one to dominate the market is commonly referred to as the pool structure. There are two categories of such a model - namely gross and net pools which refer to mandatory and discretionary participation respectively. The gross pool concept has been embraced in Australia on a national basis for the emerging reformed electricity market and in Victoria for the emerging reformed state gas market.

The essence of the gross pool market structure is that the primary market for all physical transactions is essentially a spot market with all associated transmission infrastructure from primary supply points to the trading hub operated by a centralised operator. This "big brother" concept is a much more socialistic model than the previous described one, for the system operator ensures that the balancing of physical flows with commercial arrangements is conducted in an orderly manner. In such a pool, the spot price is determined by the tendering of supply to meet demand over the established trading period, with the theory that the marginal cost of the last unit of required supply setting the price for the entire participating pool.

Since pool trading replaces bilateral trading, while price discovery is very transparent opponents to this structure believe that gaming or non-competitive participation can more easily occur from time to time. In Victoria the short term (day ahead) and the real time balancing of pipeline gas supply and demand will constitute a spot gas market. Although transmission (TUOS) and distribution (DUOS) capacity charges will be "regulated" as has been adopted in the electricity market, market participants are not responsible for contracting such capacity. Therefore, there will be no secondary market for transportation services. While this is perhaps the only model which support the light handed regulation objectives of Victoria, it remains to be seen as to whether it will deliver any real value to the marketplace. Regardless of the merits of either model, the initiation of an

instantaneous spot market in both electricity and gas in Victoria strongly reflects the views of the Victorian government that a robust spot market is an integral part of its gas reform program.

## F) The U.S. Experience - Spot Out of Control!

The U.S. gas industry has had a roller coaster ride experience with its spot market development.. The major platform enabling the development of a spot gas market in the U.S. was the Natural Gas Policy Act by the U.S. Congress in 1978 which reversed 24 years of wellhead price controls and initiated a wind down of the destructive interstate-intrastate dual gas market in the U.S. A spot gas market was established in 1983 when thousands of 30-day spot gas contracts quickly flooded into the market. FERC orders 380, 436, and 497 which were instituted from 1984 through 1986 encouraged pipeline open access and competitive neutrality, thereby growing spot activity. "By 1988, more than 300 natural gas marketing companies were in business, and approximately three quarters of all gas consumed in the U.S. was derived in spot markets at one point or another in the supply chain that year."<sup>3</sup>(refer to the attached graph).

With long term gas supply contracts as backstop contingency supply, buyers displaced such purchases en masse with lower cost spot gas. This prompted a massive take-or-pay crisis and instigated price reductions, massive renegotiations, redeterminations, reformations, buy-downs, buy-outs, and terminations of long term gas supply contracts. By the 1990's, the U.S. gas market had stabilised to a steady state with a healthy mixture of long term, medium term, and spot transactions - all market based. Gas trade in 1991 was estimated to be as follows:

*Spot (1 day - 1 week) transactions - 5%*

*Spot (30-day) transactions - 40%*

*Medium-term (less than 1 year) - 20%*

*Long-term (greater than 1 year) - 35%<sup>4</sup>*

The high level of reliance on and exposure to the spot market by the U.S. gas industry in the early 1990's was a concern at that time for both LDC's as they purchased gas supplies for the residential, commercial, and small industrial

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<sup>3</sup> *Commoditization of North American Gas Markets: Trading Gas - Trading Capacity* paper by Benjamin Schlesinger and Associates, Inc; Executive Enterprises Inc. Natural Gas Futures Conference, September 20, 1993, Houston Texas, page 3.

<sup>4</sup> *Ibid*, page 4

segments of demand and for companies attempting to develop and finance new capital intensive new gas demand projects such as cogeneration. Enron Gas Services initiated a portfolio of services based on offering various combinations of predictable pricing and reliable delivery (more detail to follow in section ). In 1992 and 1993 Enron attempted to expose the pitfalls of too much reliance by industry on a spot market in its 'See Spot' mass advertising program and its unique ability to completely manage spot.

By April 1990, a sufficiently high level of confidence existed in the open gas trading market of the U.S. that a gas futures market opened successfully on the New York Mercantile Exchange (NYMEX), the world's largest energy futures exchange. Gas futures quickly became one of the most actively traded energy commodities and was the fastest growing futures market ever introduced by NYMEX. In August 1995, a second gas futures market was introduced by the Kansas City Board of Trade to better serve the western region of North America.

## G) Canadian Experience - Better Late Than Never!

Canada's gas industry started from a different baseline from that of the neighbouring U.S. market upon its de-regulation in the mid 1980's and took a completely different migration path prior to the convergence of the two markets in the early to mid 1990's. Although both Canada's and the U.S. spot gas market are largely based on the open outcry system or bilateral deals held over bid week for the prompt month, Canada's spot gas market was rather small and restricted to the supply region of Alberta until the early 1990's. Despite the export of nearly 50% of Canada's gas production to the spot dominated U.S. gas market, Canada's domestic gas trade was heavily weighted to long term contracts with annual market based price negotiations. Such negotiations occurred each September or October and were in effect over the prompt contract year - November 1<sup>st</sup> to October 31<sup>st</sup>.

Prior to the development of a healthy spot market in Canada and the establishment of a manageable pricing relationship (basis in risk management terms) between the regional spot markets in Canada and that of the Henry Hub in the U.S., the NYMEX futures market was irrelevant to the pricing of gas in Canada. Again Enron Gas Services was a pioneer in this area and introduced NYMEX related pricing instruments or financial derivatives to the Canadian marketplace commencing 1992. The introduction of liquidity and price discovery over a shorter timeframe in Canada revolutionised the contracting practises and price offerings. Within a year most parties priced gas relative a posted index or floating price and NYMEX derived price management instruments were used by any party at any time to accomplish

that particular parties risk management concerns.

## H) Australia's Experience - Acute Birthing Labour

Australia's gas market to date has been as shallow as it gets - essentially one marketing joint venture representing one supply basin captive to one pipeline and selling to one gas utility representing a franchise or captive customers. A small spot market for gas has emerged in Queensland as a result of the recent initiation of coal seam methane testing into gas pipelines as opposed to prolonged flaring and the supply transition from the declining Surat and Denison Trough basins to the South West Qld portion of the Cooper / Eromagna basin and associated new pipeline infrastructure. The discontinuity which struck Qld was the gas supply crisis and the threat of gas rationing. Allgas Energy Ltd has been purchasing small quantities of 30 day spot gas since January, 1997 from both BHPP and Conoco. As of July 1<sup>st</sup>, 1997 a surplus of long term take-or-pay gas will flood Qld, thereby essentially killing the Qld spot market. Its only saviour will be a significant growth in demand without additional long term supply contracting.

Since most, if not all, gas demand in other states are more than sufficiently covered by long term gas supply contracts, it is rather doubtful that any other spot markets exist in the primary 'market'. The trading of gas in a secondary market has not really developed as yet for a number of reasons. The state of Victoria has proposed, after much industry debate, a gross pool model. The short term impact of such a model is debatable, given the lack of competition in the primary wholesale market.

## I) Value Propositions In An Unbundled Commodity Marketplace

In response to concerns associated with the large exposure to the U.S. spot gas market regarding price volatility and supply reliability from the local distribution companies (LDC's) who were major purchasers of gas at that time, Enron Gas Services in 1992 launched a large advertising campaign and branded its EnFolio gas resource agreements. These agreements combined Enron's physical delivery risk management capabilities and its financial risk management capabilities to offer LDC's diverse gas supply commitments. The following five branded services were introduced which offered ranges of supply reliability and price predictability over time.

1. *EnFolio GasBank* - offered the buyer superior reliability and price certainty plus valuable volume-and -take flexibility at a known price for the term of the

contract

1. *EnFolio GasBlend* - offered the buyer a dampening of the future price impact of gas price volatility through the use of a single financial instrument
2. *EnFolio GasCap* - offered firm volumes to the buyer and combined a market responsive price with a truncated price ceiling or “price cap”
3. *EnFolio Indexed* - offered the buyer with a firm delivery of gas at a price which fluctuated based either on gas or alternate fuel indices
4. *Enfolio 30* - offered the buyer a truly firm delivery commitment at a fixed price over any given month, as opposed to “best efforts” or “interruptible” or “reasonable efforts” spot purchases which had reliability risk

Enron’s marketing primary marketing campaign is attached. The primary message to LDC’s was as follows: “The EGS EnFolio program gives you control over future prices that your gas supply purchase program needs”<sup>5</sup> This rebundling of price and delivery components, branding, and niche market targeting in order to create a distinct perception of differentiation in the marketplace was a first for the North American gas industry. This is a good example of innovative packaging and tailor made marketing of precisely priced services derived from a commodity market.

## J) Conclusion

In a competitive market the price mechanism plays a vital role in the channeling of available gas supplies to willing buyers and of available markets to willing sellers. The benefits of competition are founded in its ability to serve consumers and avoid waste. Competition tends to push revenues toward costs (where costs include a rate of return sufficient to attract and hold capital) Competition also leads to prices that are based on marginal costs, i.e., the costs of bringing incremental output into an industry. Although unsustainable long run marginal costs are a factor, such costs tend to be fairly elusive and dynamic due to the increase in innovation and business practices in competitive markets and the declining industry costs due to advances in technology. While some participants may wish to sign long term contracts, in a competitive market, unlike the past, participants may be exposing themselves to more rather than less risk by entering into long term contracts.

As a spot market emerges in the gas industry it is important to note that once a **market** is established for gas in Australia it may very well quickly grow to a size that is many times greater than the historical supply/demand volume of some 800 PJ/a.

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<sup>5</sup> Enron People, published monthly by Enron Corp, June 1992 edition, page 3

For example, if Australia were to follow North America the spot market for gas would reach 2800 PJ/a (800 PJ/a demand X 7 trades per GJ between production and burner tip X 50% spot market share of total transactions). Posted cash prices have been used extensively around the world in many commodities and are the backbone of a competitive market including the pre-requisite for a futures market.

