

# Lifting the price

*The decoupling of oil and gas prices that is occurring in the mature US market heralds a progressive gas price decoupling from oil throughout the world. However, outside North America the world has been slow to adapt to this change. Here, Ruud Weijermars\* and Crispian McCredie, Alboran Energy Strategy Consultants, look at the worldwide pace of decoupling and its implications for future gas pricing.*

The traditional premium paid for oil over natural gas has gained ground in the US over the past decade. **Figure 1** compares the ratio of spot gas to oil prices from 2001 until mid-2010. Historically, US gas prices were coupled to oil prices only by market competition for their relative calorific value. The heating value of 6,000 cf of natural gas is equivalent to the heating value of 1 barrel of oil. Matching the calorific values of gas and oil at parity sets their calorific price parity ratio at 1:6, or 0.17.<sup>1</sup>

In reality, US spot gas prices have become steadily cheaper relative to oil, neglecting seasonal spikes. The US gas-to-oil price ratio (defined by \$/1,000 cf of gas divided by \$/b of oil) has lowered from 0.23 in early 2001 to 0.05 by

2Q2010. This implies that heat from gas now costs two-thirds less than heat from oil, as measured by wholesale spot market prices. Retail prices of heating oil and gas, as determined by US utilities, are substantially higher.

The firmness of oil prices compared to US spot gas prices has prompted many US gas producers to shift from gas to oil drilling. The low US gas prices are due to domestic overproduction that resulted from the competitive efforts of US independents. In fact, the production of unconventional natural gas has become uneconomic at today's depressed market prices.<sup>2</sup> The US gas price decline was exacerbated by a global LNG glut in 2009. LNG could be shipped at competitive prices to LNG import terminals anywhere in the

world. LNG spot prices started to firm up at the end of 2010, but the US excess domestic gas supply has not yet eased. As US gas demand remains flat, a reduction in gas drilling provides the only mechanism to drive up domestic prices. Such a reduction in US gas rig count started in late 2010 and is now accelerating, and the US gas price is set to recover from its decade long decline.

## European experience

In Europe, the historic coupling between oil and gas prices, via long-term contractual pegging of gas prices to oil, is now also loosening. The drivers of the decoupling process are an increase in short-term contracts, more spot market trading and a growing share of LNG contracts relative to gas contracts. This decoupling is led by the UK, which has a liquid traded market for gas at the National Balance Point (NBP). NBP gas trading emerged in the 1990s and now accounts for the vast majority of short and medium-term gas transactions. Furthermore, NBP spot gas price provides the reference price for the UK's long-term gas contracts, now rarely oil-indexed. The NBP churn factor – a true measure of liquidity – reached 17 in 2009, up from a theoretical minimum of 1 when trading started.

NBP and Henry Hub spot gas prices have become only loosely correlated. The UK spot gas price over the past three years has generally traded above US gas spot prices – as shown in **Figure 2**, which plots the two prices for the years 2008–2010. The low correlation is explained by UK spot gas prices receiving upward price pressure from continental oil-indexed gas contracts (AGIP – average German import price). **Figure 2** also shows that European spot

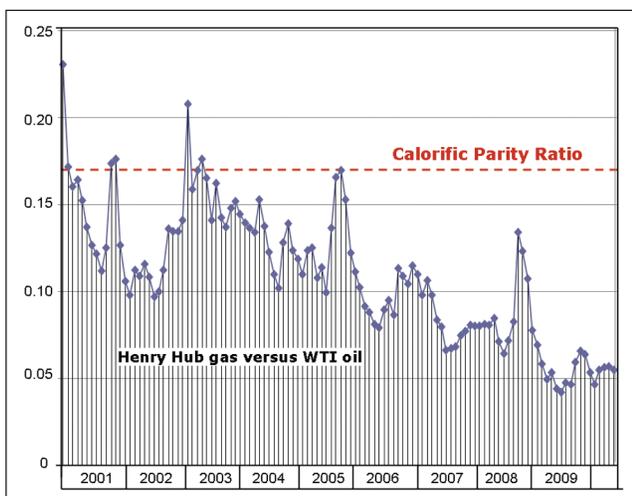


Figure 1: US gas-to-oil price ratio

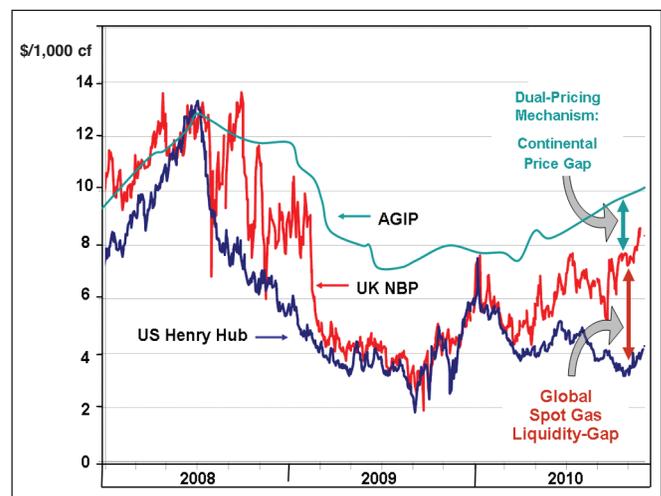


Figure 2: Gas prices at US-UK spot markets and AGIP (average German import price)

gas prices are still far from achieving true liquidity in the global gas market, as highlighted by the global spot gas liquidity-gap.

The majority of gas volumes sold in Continental Europe are still subject to long-term contracts, with wholesale gas prices well above UK and US spot prices. The reason is that Continental Europe is still caught in a dual-price dynamic and has been slower in adopting the liquid gas market model. Continental spot markets have not yet established the market shares seen at the US Henry Hub, Canadian AECO or UK NBP. The NBP accounted for 75% of all European spot gas trade volumes in 2009. However, although the volume of spot gas trades in Continental Europe continues to grow, churn factors for Continental spot markets cannot rival the hefty 17 times sales over physical deliveries seen at the UK's NBP. Churn factors of Continental spot markets in 2009 averaged 6.6 for TTF (Holland), 3.7 for Zeebrugge (Belgium) and 1.1 for NCG (Germany).

### Resilient dual-pricing mechanism

The UK-US spot markets have been responsible for the majority of overall gas sales in their markets and therefore provide a single reference price for regional long-term gas contracts. In contrast, Continental Europe's spot markets are not yet widely used as default indexes for long-term gas contracts. This explains why European gas sales can still be profitable for Continental E&P production companies, which, as stated in their 2009 annual reports, still realise annually averaged gas wholesale prices for Europe close to \$/8,000 cf – twice the US and UK 2009 average spot price. **Figure 2** shows the price gap between Continental spot markets (which trail NBP) and AGIP, a blend of oil-indexed long-term contract gas prices from Russia, Norway and the Netherlands.

Continental Europe's gas producers and traders clearly benefit more from oil-indexed gas contracts than from spot market contracts for base-load gas deliveries. Effectively, this situation gives Continental Europe a dual-pricing mechanism for gas. Continental Europe's resilient gas-to-oil price pegging mechanism was developed when the first cross-border pipeline networks emerged in the 1960s. Risk in the gas business was reduced by signing long-term contracts, typically for 15- to 20-year periods. In the majority of today's traditional European gas contracts (see **box**), the oil-coupled gas pricing mechanism remains a prominent feature, although contract durations have become shorter.

In the US to a large extent, and in the UK to a lesser extent, the introduction of spot markets has led to a situation where long-term contracts are now less favoured and must compete with more flexible spot trades. A drawback is an increase in price volatility, but the decoupling trend of gas from oil prices is moving forward, from the UK into Continental Europe. Further liberalisation of the European gas market is driven by the European Union's (EU) Third Legislative Energy and Gas Package that will come fully into force in 2011. However, the political will from Brussels to improve liquidity in the EU gas market may not be embraced quickly by Continental Europe's gas producers and traders. The outcome of this tussle remains yet to be seen.

### Rest of the world

In other world markets, domestic gas prices are controlled by the state and frequently include some form of oil-indexation. A 2009 gas price regulation study<sup>3</sup> of emerging economies signalled a slow trend from state-controlled, and often subsidised, gas prices, to a more market-driven, deregulated gas price mechanism. A key driver for the regional gas price deregulation in emerging economies is the necessity to develop higher cost domestic gas resources. However, true world gas deregulation is far away while gas prices in Russia, Malaysia, India and China remain regulated.

#### Russian gas market

Russia is responsible for 20% of global gas supply (600bn cm/y), with 60% of production consumed domestically. Domestic gas prices are subject to the Federal Tariff Service, which controls Gazprom's sales with a pricing formula that provides netback to the wellhead. There is a sliding scale to account for transport to the end-user's location. Transport price penalties are enforced to ensure that supply volumes remain manageable. The Russian government is determined to reduce the gap between regulated domestic and European export netback, as domestic supply cannot cover the true cost of production and supply, as alleged by Gazprom. Export contracts are oil-indexed.

#### Malaysian gas market

Malaysia, ranked number nine in the 2009 International Energy Agency (IEA) list of world gas exporters, produces 237bn cm/y of gas for domestic consumption, while another 29bn cm is allocated for LNG export. Petronas has a state monopoly for vertically inte-

grated gas operations, but private companies can participate in E&P activities via production sharing agreements (PSAs). Gas prices at its three principal gas fields (Terengannu, Sabah and Sarawak) are subject to price regulation by the Economic Planning Unit (EPU), under the Prime Minister's Office. Domestic prices are nominally fixed and in line with low production cost. Offshore Sarawak export gas prices are linked to the global LNG prices, which are largely oil-indexed.

#### Indian and Chinese gas markets

Today, India and China are home to nearly 40% of the world's population, but jointly consume only 5% of global gas supply. Both India's (60bn cm/y) and China's (100bn cm/y) gas consumption are set to rise at rates of 10bn cm/y over the coming decade; their respective share of global gas consumption rising to 5% and 7% by 2020. Both gas markets are regulated.

India's administered price mechanism (APM) indexes the gas price to the international price of oil products and ensures a handsome 12% post-tax profit for gas operators. India was first in setting a price-floor for gas to stimulate the development of domestic gas resources. Its New Exploration Licensing Policy (NELP), set up in 1999, ensures a wellhead price-floor based on cost plus a reasonable margin, as well as a ceiling based on domestic prices for alternative fuels. NELP's 2007 reset resulted in an effective gas price-floor of \$2.50/1,000 cf and a price-ceiling of \$4.20/1,000 cf, both linked to Brent oil prices. National oil company ONGC now strives to bring its domestic onshore production under APM in line with NELP prices by an annual increase of 2%, until the NELP price ceiling is reached. In fact, India's NELP sets a remarkable precedent for a solution to mitigate future wellhead gas price slumps in the US.<sup>4</sup>

### Decoupling conclusions

Global gas prices are set to rise, lifted by oil-indexed gas contract prices in both regulated and deregulated markets, with rising oil and LNG prices supporting the price lift. US gas prices are fully decoupled from oil prices and trade at calorific discount values that are historically low relative to oil. Meanwhile, UK gas prices, largely decoupled from oil, have begun their recovery and are dominated by flexible spot gas trades with high liquidity at the NBP.

Gas prices in regulated Continental Europe are in a dual-price making regime. Prices stayed relatively firm over the recession as most volumes are

sold under long-term oil-indexed gas contracts rather than at volatile spot gas prices.

Gas prices in emerging economies (such as Russia, Malaysia, India and China) are strictly regulated and gas is sold at marginal cost. The governments of gas exporters (Russia and Malaysia) are under some pressure to bring domestic gas prices in line with export prices. Emerging gas markets are likely to remain under state control, but governments are moving away from domestic subsidies to afford future development of domestic gas supplies and minimise the impact on national budgets.

Global gas prices will continue their recovery as long as LNG producers do not flood the market faster than consumption rises. In the past, gas has often been a cheaper liquid fossil fuel than oil, but gas price elasticity is in favour of firmer prices. Given time, natural gas prices will match or beat the calorific parity value of crude oil.

A final hurdle for increased gas consumption is for gas to replace coal as the premium fuel for power generation. Coal is still a cheaper alternative than gas, but it lacks the 'green' cre-

entials of natural gas. Greenhouse gas taxation schemes could press the world's electrical power generators to burn less coal and more gas. However, passing legislation for such a massive shift from coal to gas is unlikely to happen quickly in times of slow economic recovery. But, when environmental concerns win over economic woes, gas will be King – not coal. ●

## References

- 1 Gas value chain analysis. *J. Nat. Gas Sci. & Eng.*, Vol. 2, pp86–104, 2010.
- 2 Gas price scenarios. *Oil & Gas Journal*, Vol. 109, No 1, pp74–81, 2011.
- 3 Gas pricing policies. Shell report, November 2009.
- 4 Wellhead price-floor regulation. *First Break*, Vol. 28, pp33–38, September 2010.

\*Also at Delft University of Technology

## Traditional European gas market pricing

Continental gas contracts stipulate that substantial time-averaged price changes in fuel oil and gas oil give parties the right to adjust the gas price, either up or downward. Pioneered by the Dutch companies NAM and Gasunie (now GasTerra), and with support from Exxon and Shell, the Dutch export price mechanism has become broadly adopted within Continental Europe.

Wholesale gas export contracts to

Germany, Belgium and France use gas-to-oil indexing. This price mechanism has also been adopted by Sweden, Denmark and even Soviet import contracts with European partners modelled after the Dutch treaty. The transparency of the pricing mechanism explains its success. Price risk is for the gas trader and volume risk is for the receiving utility, with volumes delivered and taken at the agreed price. ●

... continued from p13

months and it earned a degree of additional credibility from a newly launched technology alliance with Shell. Its main independent competitor, UK-based Offshore Hydrocarbons Mapping (OHM), has struggled to stay in the game and has offloaded the operations arm of the company. OHM's main focus these days is to develop ways of integrating EM information with other data, which is seen as the passport to more widespread use of the CSEM method. WesternGeco, after some significant investment, is taking a backseat on CSEM. PGS, on the other hand, believes that it can develop a dual seismic/EM streamer-based acquisition system. If this is successful, it would surely make EM a very attractive proposition without the necessity of a separate CSEM survey operation.

### Mixed messages on land

The current story of land seismic is one of mixed messages. Most confusing was the decision by PGS to sell its onshore seismic operation to Houston-based company Geokinetics, suggesting disillusion with the economics of this sector of the business. Not long after, it entered into a big R&D programme with Shell to adapt its fibre-optic deep-water cable technology for land use. Also, last year, one of the old originals of land seismic, ION Geophysical, was

basically forced by financial circumstances to join with the Chinese company BGP, the largest land seismic company in the world, to form INOVA. The new company, 51% owned by BGP, is taking over all ION's land seismic manufacturing and development, including its recently introduced Firefly cableless acquisition technology.

Such developments imply that the land seismic market continues to be difficult, yet some of the technology challenges which have long dogged the business are being resolved. CGGVeritas and WesternGeco are now offering the capability to produce dramatically higher channel counts for data acquisition which has traditionally been poorly sampled and noisy. In addition, the advent of new generation cableless seismic acquisition systems open the possibility of more economic, less logistically challenging operations, especially in difficult terrains. The current view in the industry seems to converge on a future where conventional cable and cableless systems will both have their place, often working in tandem. While cableless might seem the ultimate solution, there are issues – for example, regarding the communication between wireless units in the field and battery life.

### Looking ahead

On the sidelines of the activities of the main E&P geophysical business sector

are two developing stories destined to make bigger headlines in the future. Firstly, the shale gas production boom has given birth to the development of passive seismic monitoring listening devices spread around drilling operations to analyse how formations are breaking apart. The fracturing data is transmitted to the driller and used to better understand how the formation is behaving in order to increase production and the percentage of gas that can be recovered without drilling more wells. The leading independent company Microseismic, which in 2006 could barely raise \$7mn, has just completed a funding round worth more than \$100mn – a clear indication of how favourably the technology potential is viewed today.

The second significant opportunity for the seismic business in the years to come arises from carbon capture and storage (CCS) initiatives around the world to combat climate change. Seismic monitoring is already being called upon to verify the suitability of selected geological structures for proposed CCS projects.

One way or another, therefore, seismic and other geoscientific technology has a long way to go before it outlives its usefulness. ●

\*Editor of First Break, the flagship publication of the European Association of Geoscientists and Engineers.