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International gas pricing in Europe and Asia: A crisis of fundamentals ☆

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HIGHLIGHTS

- International gas prices in Europe and LNG importing Asia no longer reflect market fundamentals.
- This became highly problematic in Europe post-2008 and in Japan post-Fukushima.
- The result has been a significant switch to hub pricing in Europe.
- In Asia, no substantial action has been taken beyond some new contracts based on Henry Hub prices.

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ABSTRACT

In Continental Europe and LNG importing Asia, international gas prices reflect the market fundamentals of the 1970s–1990s when gas was replacing oil products and crude oil in energy balances. By the end of the 2000s, fundamentals in both these regions had changed significantly, but gas price formation mechanisms had not. This created major problems for buyers locked into long term contracts indexed to crude oil and oil product prices, which had risen to levels far above gas market fundamentals. By 2013, the transition to hub-based pricing was well advanced in Europe and dominant in the large markets in the north west of the Continent. In Asia the "crisis of fundamentals" was only just starting to be addressed with a transition to market pricing an urgent imperative, but still a distant prospect.

1. Introduction

The academic literature on oil pricing is huge. By comparison, there is very little to read on natural gas pricing, despite the fact that the fuel is approaching 25% of global primary energy consumption. In the majority of countries outside North America, international gas prices are not transparent and accurate public domain data are very difficult to obtain. This may not have been a great problem when the fuel comprised only a few percentage points of energy balances but as gas has become more important, so has the way in which it is priced.

The vast majority of international gas trade outside North America is still conducted on the basis of 10–30 year contracts with complex price clauses. The most important elements of these clauses are: the base price (Po) and the index (which determines how the base price is adjusted over time). Related to pricing is the take or pay clause present in the majority of long term contracts, which requires the buyer to pay for a specified minimum quantity of the annual contract quantity of gas at the contract price, whether or not that volume of gas is taken. Long term contracts between domestic producers and exporters, and national or regional utilities, provided the basis for the establishment and initial decades of the gas industry's growth, particularly in Continental European and Asian LNG importing countries which are the focus of this article.

International trade allowed gas industries to develop and expand beyond their indigenous resource base, but contracts needed to be long enough for investments to be recovered in both exporting and importing countries, and to provide a guaranteed cash flow to assist the financing of those investments. It is useful to briefly review the pricing principles that negotiators originally applied (or at least should have been trying to apply) in long term gas contracts, making a distinction between economic and market fundamentals. Economic fundamentals refer to the cost of developing and delivering domestic or imported gas to end-users. Market fundamentals refer to the price of gas, compared with the price of market substitutes.

The logic of the division of risk inherent in these contracts was that:

- the exporter assumed the price risk i.e. the risk that the price, however determined, would be sufficient to remunerate the investment in production and transportation of gas to the border of the importing country;

☆The ideas expressed in, and parts of the text of, this article are taken from Stern (2012). Stern, J.P. (Ed.), 2012. The Pricing of Internationally Traded Gas. OIES/OUP, Oxford.

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- the importer assumed the volume risk (via the take or pay provision) i.e. that a large enough market would be developed in order to honour the volume commitments in the contract.

In these contracts, prices are generally adjusted quarterly, based on an average of (mainly) oil prices in the preceding 6–9 months, with a lag of 3 months. Thus, the buyer pays a price in the first quarter of a year related to an average of oil prices in the first two or three quarters of the previous year. It was always assumed that market conditions would be affected by a combination of changes in: prices of competing fuels, GDP growth rates, inflation and taxation, industrial structure, environmental regulations and a range of other country- (or possibly region-) specific conditions. These changes were generally dealt with by means of a "price review" clause which allowed the base price (Po) and the indexation formula to be "reset" (generally) every 3 years. But in most contracts, the scope to make fundamental changes to the price formula is limited.

While these rigidities caused some problems in the decades prior to 2008, since that date the situation became substantially more difficult because of rapid changes in oil prices and the "globalisation" of gas markets, which means that events which cause movements in the supply, demand and prices of gas (and other energy commodities) in one regional market have much more immediate impacts on gas prices in other markets than was previously the case (i.e. developments in North America and Asia have impacts on Europe, and North America and Europe have impacts on Asia). The most important such events during the period 2008–2012 have been

- the increase in crude oil prices above $100/bbl on a sustained basis;
- substantial fluctuations in international coal prices which impacted gas demand in the power generation sector;
- the unexpectedly rapid development of shale gas production in North America which caused Henry Hub prices to fall to much lower levels than had previously been thought possible, reducing US LNG imports to minimal levels, and creating the prospect of substantial North American exports of LNG in the second half of the 2010s.
- short term power and carbon price movements which have led to changes in the "spark spread" and "dark spread";
- the March 2011 Fukushima nuclear disaster in Japan which significantly increased the demand for short term LNG supplies in that country, substantially tightening the global LNG market;
- the emergence of significant new LNG markets in China, India, South East Asia, Latin America and the Middle East;
- post 2008 recession in Europe which has been longer and deeper than expected, impacting energy and gas demand, particularly when coupled with significant increases in renewable generating capacity in many countries;
- political developments in (principally) North African countries (the "Arab Spring") which curtailed gas exports from Libya for most of 2011.

Combinations of these events have meant that, since 2008, the commercial environment for international gas trade has been subject to new (and increasingly difficult to predict) forces which have exacerbated the problems of adherence to the relatively rigid oil-linked price formulae in long term contracts. For reasons of space, this article concentrates on the situation in Continental Europe and LNG importing Asia; Stern (2012) reviews problems in many other regions which are increasingly becoming involved in international gas trade.

2. International gas pricing in Continental Europe[1]

Starting around 1990, several trends began to appear which had not been anticipated either by governments or European gas stakeholders. First, it was never intended or expected that gas would become such an important fuel in European energy balances. With the exception of the Netherlands, where the discovery of the huge Groningen gas field meant that there was an incentive to use as much as possible of a domestic energy source, gas was deemed to be a "premium fuel" which should only be used in high value sectors such as for residential heating and cooking, and industrial processes requiring a clean and controllable heat source. Using gas for power generation was not only frowned upon but largely prohibited by a 1975 European Directive with restrictions being lifted only in the early 1990s.[2] From 1980 to 2005, European gas demand expanded continuously and dramatically due to a combination of

- the success of gas in taking market share from oil products, significantly assisted by the almost continuous increase in oil prices during this period;
- the failure of coal and nuclear power to expand to the extent anticipated in many countries, partly for (local and regional) environmental reasons, and partly due to cost and risk considerations particularly for nuclear power.

As gas expanded its market share, so the pricing logic which had been established in long term contracts began to break down. The dominant price mechanism in European long term gas contracts dates back to the first sales of Dutch gas. Variously known as: the Groningen, replacement value, market value, and netback market value principle; the origins can be traced back to the Dutch Minister of Economics J.W. de Pous in the early 1960s.[3] The price paid by the gas company to the foreign or domestic gas producer at the border, or the beach, is negotiated on the basis of the weighted average value of the gas in competition with other fuels, adjusted to allow for transportation and storage costs and any taxes on gas.

In Continental Europe the competitive fuels were largely oil products – gas oil and (heavy or light) fuel oil. Economic and market fundamentals should determine – or at least play a significant part in determining – gas prices and, when the netback market pricing mechanism was originally created, it could be argued this was the case.[4] But during the 1990s, the pricing of internationally traded (and domestically produced) gas moved increasingly out of line with both economic and market fundamentals. However, this did not cause major problems because of the commercial model of Continental European gas utilities, and despite changes in the structure of energy markets.

The commercial model of the traditional Continental European gas utilities, established in the 1970s and 80s, was relatively simple: they segmented their customer base depending on the

[1] The focus is on Continental Europe because the UK liberalised its gas market in the 1990s and created a hub (the National Balancing Point – NBP) which had become the dominant price formation mechanism by the end of that decade (see Heather, 2010).

[2] Official Journal of the European Communities, L178/24, 9 July 1975; Official Journal L75/52, 21 March 1991.

[3] For details of this pricing structure and its historical importance in European gas markets see Stern and Rogers (2012), especially pp. 54–59.

[4] In relation to production costs this was, in many cases, manifestly untrue, particularly for associated and even for non-associated gas production, but it had a certain logic which, given higher transportation costs compared with oil, was not completely unreasonable. In many non-OECD countries, particularly oil-producing and exporting nations, gas prices were extremely low reflecting the economic fundamentals of producing gas in association with oil.

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