Trends in Wholesale Gas Price Formation Mechanisms: Results of the 2009 IGU Survey

By Mike Fulwood

The third IGU survey of wholesale gas price formation mechanisms for the year 2009 was completed in late 2010, following on from similar surveys for 2005 and 2007. The idea for the survey arose at the beginning of the 2006-9 Triennium. The Strategy, Economics and Regulation Programme Committee (PGC B) had set up a new sub-group to consider gas pricing, with a key remit to carry out a comprehensive analysis of gas price formation models. The sub-group decided to carry out a survey of current pricing mechanisms around the world, not only for gas traded internationally, but also for gas produced and consumed within countries. IGU members were surveyed and provided data for almost 100 countries, and the survey responses were collated and analysed by Nexant.

The focus of the gas pricing sub-group, and the surveys, was very much on wholesale prices, which can cover a wide range. In fully liberalised traded markets, such as the USA and the UK, the wholesale price would typically be a hub price (e.g. Henry Hub or the NBP). In many other

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Table 1.

TYPES OF PRICE FORMATION MECHANISMS

Oil price escalation (OPE)	The price is linked, usually through a base price and an escalation clause, to competing fuels, typically crude oil, gas oil and / or fuel oil. In some cases coal prices can be used.
Gas-on-gas competition (GOG)	The price is determined by the interplay of supply and demand – gas-on-gas competition – and is traded over a variety of different periods (daily, monthly, annually or longer). Trading takes place at physical hubs (e.g. Henry Hub) or notional hubs (e.g. NBP in the UK). If there are longer-term contracts these will use gas price indices to determine the price. Spot LNG is also included in this category.
Bilateral monopoly (BIM)	The price is determined by bilateral discussions and agreements between a large seller and a large buyer, with the price being fixed for a period of time – typically this would be one year. There may be a written contract in place but often the arrangement is at the government or state-owned company level.
Netback from final product (NET)	The price received by the gas supplier is a function of the price received by the buyer for the final product the buyer produces. This may occur where the gas is used as a feedstock in chemical plants, such as ammonia or methanol, and is the major variable cost in producing the product.
Regulation: cost of service (RCS)	The price is determined, or approved, by a regulatory authority, or possibly a Ministry, but the level is set to cover the "cost of service", including the recovery of investment and a reasonable rate of return.
Regulation: social and political (RSP)	The price is set, on an irregular basis, probably by a Ministry, on a political / social basis, in response to the need to cover increasing costs, or possibly as a revenue raising exercise.
Regulation: below cost (RBC)	The price is knowingly set below the average cost of producing and transporting the gas often as a form of state subsidy to its population.
No Price (NP)	The gas produced is either flared, or provided free to the population and industry, possibly as a feedstock for chemical and fertiliser plants. The gas produced may be associated with oil and / or liquids and treated as a by-product.
Not known (NK)	No data or evidence.

countries, where gas is imported, it could typically be a border price. The more difficult cases are countries where all gas consumed is supplied from indigenous production, with no international trade (either imports or exports) and the concept of a wholesale price is not recognised. In such cases the wholesale price could be approximated by wellhead prices or city-gate prices. Generally the wholesale price is likely to be determined somewhere between the entry to the main high pressure transmission system and the exit points to local distribution companies or very large end-users.

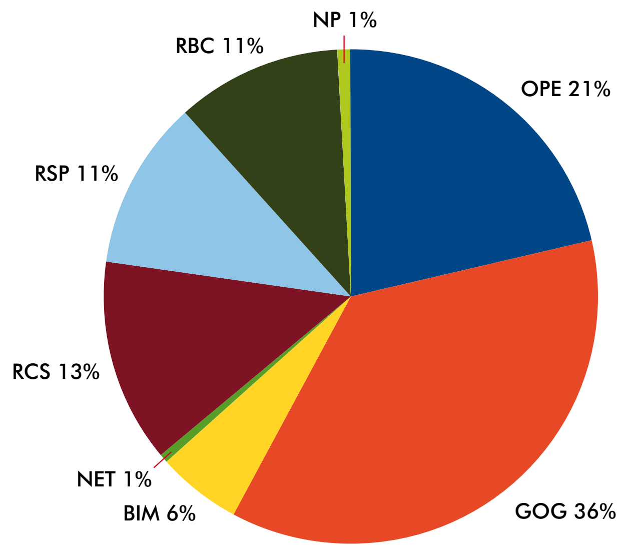
The initial data collection was done on a country basis. The data were then collated to a regional level using the standard IGU regions. In preparation for the initial survey, a series of discussions were held at the PGC B.2 sub-group meetings on the definition of different types of price formation. It was decided to use for categorisation purposes the wholesale pricing mechanisms described in *Table 1*.

Results of 2009 survey

In looking at price formation mechanisms, the results have generally been analysed from the perspective of the consuming country. Within each country gas consumption, ignoring storage, can come from any combination of three sources, indigenous production, pipeline imports and LNG imports. Data was collected separately for each of these three gas supply sources showing the percentage of the wholesale price which is determined by each of the nine pricing mechanisms.

Each country was then aggregated in one of the IGU regions and finally the IGU regions were aggregated to give the results for the world as a whole. As well as collecting information on price formation mechanisms by country, information was also collected on wholesale price levels in each country.

WORLD PRICE FORMATION MECHANISMS 2009



Note: Percentages rounded, NK was less than 1%.

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Figure 1.

The results presented here focus on the world picture with some regional breakdown, and not particularly on the breakdown of the different categories of indigenous production and imports, although such detailed information is available.

Figure 1 summarises the 2009 survey results at the world level.

The largest single price formation category in 2009 was gas-on-gas competition at 36%. This was across all categories – indigenous production (especially in North America), pipeline imports and LNG imports. Oil price escalation accounted for some 21%, but was largely in pipeline imports and LNG imports. The three regulated categories accounted in total for some 35%, split broadly equally between the three – cost of service, social and political and below cost. The regulated categories were almost exclusively from indigenous production.

In *Table 2 (over)* the regional breakdown by price formation category is highlighted.

WORLD PRICE FORMATION 2009: REGIONAL BREAKDOWN

2009	Total Consumption (BCM)									
	OPE	GOG	BIM	NET	RCS	RSP	RBC	NP	NK	TOT
North America	0.0	789.4	0.0	0.0	0.0	0.0	0.0	9.8	0.0	799.2
Latin America	19.7	18.0	5.2	14.0	13.1	59.0	0.0	0.0	0.0	129.0
Europe	371.7	155.7	2.3	1.0	0.0	19.1	0.4	4.6	0.0	554.7
CIS	0.0	130.3	88.4	0.0	284.5	21.0	96.5	3.8	0.0	624.5
Middle East	19.7	1.0	30.4	0.4	0.0	121.6	162.6	3.2	2.0	340.9
Africa	6.2	0.0	3.3	0.8	0.6	8.8	77.2	0.7	0.0	97.6
Asia	68.7	6.7	3.1	0.0	106.0	30.0	3.3	0.0	0.0	217.8
Asia-Pacific	175.4	18.7	45.8	0.0	7.9	79.6	0.0	0.0	2.4	329.9
Total World	**661.4**	**1,119.8**	**178.5**	**16.2**	**412.1**	**339.1**	**340.0**	**22.0**	**4.4**	**3,093.6**

ABOVE
Table 2.

The gas-on-gas competition category is obviously dominated by North America, but in Europe with the UK market and the continental trading hubs it is also important. The contributions from Asia and Asia-Pacific largely reflect spot LNG sales. It may also seem surprising there is deemed to be significant gas-on-gas competition in the CIS region, specifically Russia. This reflects the significant changes in the domestic Russian market which has seen the larger consumers being allowed to trade directly with independent producers at negotiated prices. Previously much of this sector was price regulated, as the rest of Russian domestic consumption is, largely supplied by Gazprom.

The oil price escalation category is dominated by imported gas under long-term contracts, linked to oil product prices, into Europe, as well as the LNG contracts into Asia-Pacific, linked to crude oil prices. The level in Asia is a combination of LNG imports and indigenous production in Pakistan and India.

The bilateral monopoly category is important in intra-CIS trade and indigenous production in Qatar, Australia and New Zealand. In Australia, outside the spot market in Victoria, the majority of gas is sold under 10-to-15-year contracts where the price of gas is fixed initially and then changes in line with inflation. The initial base price reflects the market fundamentals at the time of negotiation.

The three regulated categories – cost of service, social and political and below cost – are found predominantly in indigenous production in the CIS and Middle East, plus China, Malaysia and Indonesia.

It should be emphasised that choosing the categorisation of price formation mechanisms in individual countries is not an exact science. In particular, the distinction between the gas-on-gas competition and bilateral monopoly categories in, for example, Russia and Australia may be becoming increasingly blurred. Since the first IGU survey for 2005, wholesale prices under the BIM category have risen to be much closer to, what might be called, "market" levels.

As well as collecting data on price formation mechanisms the IGU study also collected information on wholesale price levels in 2009. The results here should be treated as broad orders of magnitude, since the definition of wholesale prices is quite wide. It is typically a hub price or a border price in the case of internationally traded gas, but could also easily be a wellhead or city-gate price.

Figure 2 (*over*) shows a snapshot of price levels for 2009. From year to year, wholesale prices can obviously change significantly. Generally the highest wholesale prices are in regions where, it

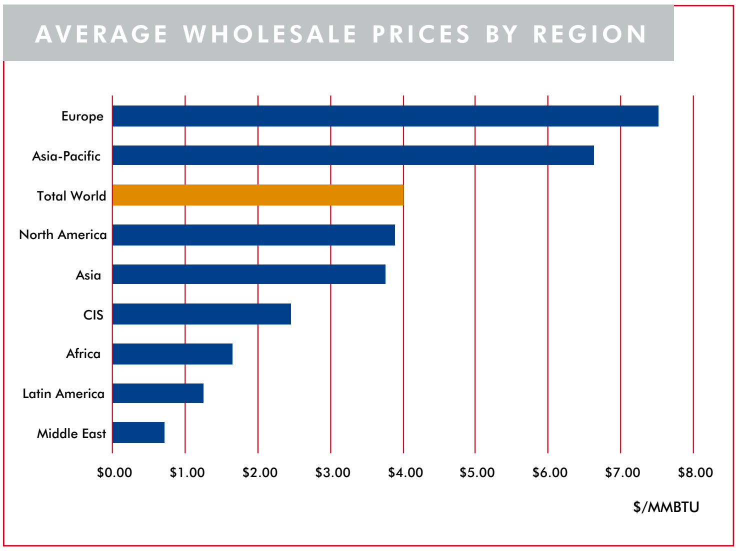

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Figure 2.

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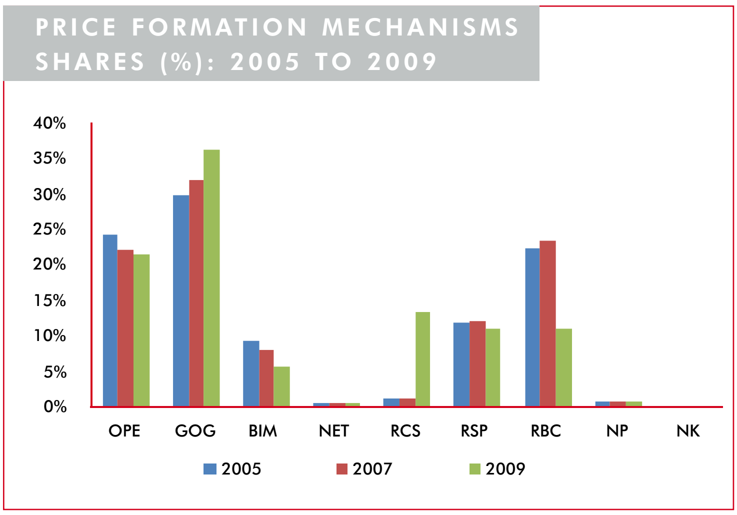
Figure 3.

could be said that, there is more "economic" pricing – i.e. gas-on-gas competition and oil price escalation – in Europe, Asia-Pacific and North America – although the decline in spot prices in the latter has brought prices down compared to previous surveys. With both China and India increasing wholesale prices recently, the average is now very close to North American spot prices. The lowest wholesale prices are generally where regulation (or state decrees) dominates in the Middle East, Latin America, Africa and the CIS.



Changes in price formation mechanisms

As the 2009 survey followed the 2005 and 2007 surveys, it enables an analysis of changes in the relative importance of price formation mechanisms to be undertaken. Changes in the relative importance of the different price formation mechanisms can occur either because of differential growth in consumption between countries or because price formation mechanisms themselves change.

While world consumption grew by just over 8% between 2005 and 2009, this masked very different changes between regions. Consumption in Europe and the CIS declined, in contrast to a more than 50% increase in Asia – India and China – and a 30% plus increase in the Middle East. The decline in Europe would imply that the oil price escalation category would decline in importance while the rise in Asia and the Middle East would suggest the regulated categories increasing, although this would be partly offset by the decline in CIS consumption.

Figure 3 shows the respective percentage shares in the different price formation mechanisms for 2005, 2007 and 2009.

The main increase has been in the gas-on-gas competition category rising from 30% in 2005 to 32% in 2007 and to 36% in 2009. If consumption patterns had not changed between regions from 2005 to 2009 the GOG category share would have been some 2% higher in 2009 at 38%. The key change from 2007 to 2009 was in the CIS following the changes in the domestic Russian market, which added some 4% share. The share in Europe has been increasing steadily from 2005 through 2007 and 2009 as the importance of continental trading hubs increases, at the expense of oil price escalation. The gas-on-gas competition share in Asia-Pacific increased between 2005 and 2007 but declined from 2007 to 2009 as the impact of the recession resulted in declines in spot imports into Japan, South Korea and Taiwan, although the 2009 share was still

CHANGES IN WHOLESALE PRICE LEVELS (S/MMBTU): 2005 TO 2009

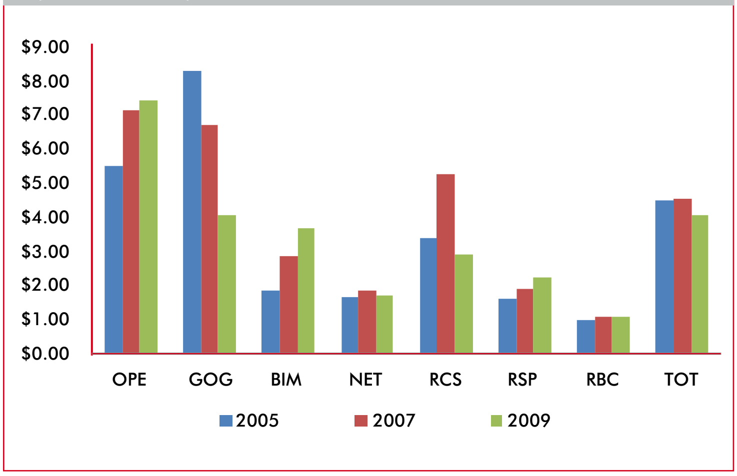


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Figure 4.

higher than in 2005. The decline in the oil price escalation share from 2005 to 2009 has been wholly down to the changes in Europe, partly offset by a slight increase in share in Asia between 2007 and 2009, as the new East Coast Indian production came onstream.

The bilateral monopoly share has been in steady decline from over 9% in 2005 to just under 6% in 2009. This reflects wholly the changes in Russia's price formation mechanisms. The overall share of the three regulated categories has changed little from 2005 through 2007 to 2009, staying at around 35%, although based on the more rapid growth in consumption in some of the areas where regulated pricing predominates, the share should have risen slightly if price formation mechanisms had not changed. The key change has been within the regulated categories with a switch in Russia from below cost to cost of service of a share of 9% of total world consumption. This change in categorisation reflects the fact that Gazprom no longer makes losses, on an average cost basis, on regulated sales into the domestic market.

In respect of the levels of wholesale prices, average prices around the world have changed little from 2005 through 2007 to 2009. However, there have been significant changes to price levels in the different price formation categories (*see Figure 4*).

Average wholesale prices were just over $4.00 per MMBtu in 2009, slightly down from $4.50 in both 2007 and 2005. Over the period gas-on-gas competition prices have been on a declining trend from being the highest prices in 2005 at over $8.50 to just over $4.00 in 2009 – around the world average. In contrast oil price escalation prices have risen consistently reflecting increasing oil prices over the period. Bilateral monopoly prices have also been consistently rising but this reflects the transition, especially in intra-CIS trade, towards more market related pricing.

Conclusions

The trend towards more gas-on-gas competition continued in 2009, rising to 36% of world gas consumption, from 32% in 2007 and 30% in 2005. The increase between 2007 and 2009 was largely due to changes in the domestic gas market in Russia together with the continuing growth of trading hubs in Europe. The growth in Europe was at the expense of the oil price escalation category which continued to decline from the 24% level in 2005 to 22% in 2007 and 21% in 2009. This was partly offset by a rise in Asia as a result of new production in India. The three categories of regulated prices amounted to some 35% of world gas consumption in 2009, broadly the same level as in 2007 and 2005. However, there was a significant shift in 2009 in the regulation categories away from below cost towards cost of service as regulated prices in Russia rose to more economic levels.

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