

Secondary and Short Term Natural Gas Markets in Colombia: Reform Options

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Terms of Reference

Market Analysis and *The Brattle Group* commissioned to advise on the design and implementation of short-term and secondary markets for trading of gas and gas transport capacity in Colombia.

1. Our first report addressed Tasks 2 and 3 of the project - relevant analytical framework and international experience.
2. Second report addresses Task 4 - describes different options for developing secondary and short-term markets for gas and transport capacity in Colombia.

Specifically, Task 4 requires us to:

- identify possible combinations of markets that might be developed
- consider how short-term and secondary markets for gas and transport will interact with primary markets
- consider the pros and cons of any particular combination of markets, and the role of the government in facilitating the development of, or organizing, these markets.



Background and Objectives

1. Our Task 4 report *does not* make specific recommendations. Rather defines objectives and assesses the pros and cons of the alternatives market forms identified.
2. Options or proposals we present do not contain all of the detail needed for implementation, but identify main alternatives and key changes required for their adoption.
3. Nor do we attempt to specify how they would be made compatible with existing legislation and regulations, such as the RUT and draft ministerial decree of March 2011.
4. Following further consultations with the CREG and the industry, a Task 5 report will make recommendations on the markets and their management mechanisms.



Policy and Reform Objectives

Central objective is to create secondary and short-term markets to promote economic efficiency by:

1. Facilitating trade between market participants i.e. reducing transactions costs and improving market liquidity.
2. Providing more reliable price signals for both short-term production and consumption as well as for longer-term investment and location decisions.
3. Improving market competitiveness, esp. by “leveling the playing field” for smaller traders and new entrants, i.e.
 - allowing them to trade with the “market” rather than needing to negotiate contracts with large incumbents
 - guaranteeing them the ability to purchase or sell on the same terms as every other trader in the market
 - providing them with the same market information as every other trader at low cost



Evaluation Criteria 1

Some key attributes of, or criteria for evaluating, different market designs are:

Information: Transparent and open markets facilitate efficient trading by providing information on prices, resource availability and potential trading partners. By making the same information equally available to all market participants, they also help smaller traders and new entrants by relieving them of the burden of information acquisition, which will typically be less costly for larger firms.

Liquidity: A key challenge in the natural gas markets around the world (addressed most successfully in Europe and the United States) has been to achieve sufficient market liquidity. Thin markets make efficient trades more difficult to achieve for participants and reduce the reliability of price signals.



Evaluation Criteria 2

Market competitiveness: Large, or dominant players, in a market can discourage efficient trade and investment.

- dominant firms may be able to impose contractual and other conditions of trade to their advantage
- traders may be reluctant to use markets in which prices can be manipulated by dominant companies, acting either independently or collusively
- large firms may use informational advantages obtained from their dominant market positions to discourage secondary trading by smaller players.

A key issue is whether and how to restrict the activities of large or dominant firms in secondary market trading.



Evaluation Criteria 3

Coordination between gas supply and transport: There is a crucial link between the availability and pricing of transport capacity, and the liquidity of trading in primary and secondary markets.

- liquid secondary markets have developed with both point-to-point transportation contracts (in the USA) and with an entry/exit contracts (in Europe).
- simultaneous secondary trading of gas transport capacity may facilitate secondary gas trading in point-to-point systems.
- in an entry-exit system there is less need since once gas is injected into the system, it is available to all buyers and there is no need to buy capacity that will transport the gas to a specific location in the network.

The design of trading arrangements for gas and transport capacity should to be consistent and mutually reinforcing.

Evaluation Criteria 4

Transition and ongoing costs: Changes in market design or regulation create different types of costs.

- costs required for investment in the new market design, for example the creation of new organisations, hardware or IT systems.
- costs associated with reallocating rights and obligations under existing long-term contracts, and at the extreme the risk of creating stranded contracts and investments.
- possible increase in perceived regulatory risk. Gas production and transmission involve long-term, irreversible investments, the value of which are vulnerable to changes in regulatory rules
- ***On-going costs:*** New market arrangements may imply higher costs e.g. if market participants are required to frequently report large amounts of detailed information on their trading activities, or to pay for the running of new organisations. Any ongoing costs should obviously be proportional to the ongoing benefits.

Any new market designs for short-term and secondary markets should be considered against these general criteria.



Current Situation in Colombia

- currently no organized markets for secondary or short-term trading of gas or transport capacity in Colombia
- nor any organized methods for collecting and disseminating information on trading activities (BEOs)
- but a significant amount of secondary market trading takes place, driven by gas-fired power plants need to resell gas and transport capacity purchased under firm contracts for the firm energy market
- (approx 45% of Colombian gas supply purchased by power plants for the firm energy market and is available for resale)
- some power companies resell most of their surplus gas in conditional firm contracts; others sell only small amounts this way and the rest in shorter-term transactions
- one large Colombian distribution company purchases up to 20% of its gas supplies in the secondary market from the gas-fired power plants



Demands for Change

There is a clear demand for the creation of more organized markets or trading platforms for gas and transport in Colombia.

- producers, transporters and shippers have *unanimously* argued for more transparent information on market transactions and transport capacity availability
- many argue for improved supply-transportation coordination
- most companies want organized and administered short-term and secondary markets, which exclude or limit the participation of the large producers
- some suggest trading in these markets should be mandatory, others voluntary
- while no consensus on all details of market reforms, all market participants believe that trading opportunities will be improved by greater market transparency and organization of one type or another.



Reform Options

Task 4 report describes several approaches to developing more transparent and liquid short-term and secondary markets for gas and transport capacity.

Presented as a number of 'nested' reform options, or policy packages, involving increasing degrees of regulatory intervention, organization and changes to the status quo.

- Option 1: *Gradual Market Evolution.*
- Option 2: *OTC Trading and Development of Trading Points*
- Option 3: *A Gas Exchange*
- Option 4: *A Single Trading Point or Physical “Hub”*
- Option 5: *Entry-Exit Charges and a Virtual Trading Point*

'Nested' means that the options could be adopted progressively over time.



Option 1: Gradual Market Evolution (Contracts)

Introduces no new formal market mechanisms introduced. Rather, reforms to promote the growth and development of existing bilateral trading activities.

1. Gas supply contracts would be standardized to allow faster, lower-cost bilateral trades. By 'standardized' contracts, we mean:
 - basic terms and conditions of all contracts would be identical and;
 - a menu of standard contract durations and start dates - e.g. a within-day gas product, a day-ahead product, week-ahead, month-ahead, quarter-ahead and possibly longer-term contracts
 - contracts for a given duration and start date would only need to specify the parties, price, quantity and delivery point.
1. No product standardization with respect to the delivery point, and buyers and sellers would be able to deliver and receive gas at any point in the network.
2. Traders would need to procure transport capacity to transport the gas away from the point of sale.



Option 1: Gradual Market Evolution (Information)

1. MO would be established to collect and publish aggregate data on volumes and prices of secondary market trades in gas.
2. All traders required to report to MO details of their secondary market transactions, including the volumes, counter-parties and agreed prices.
3. MO would publish daily prices and volumes traded for each type of standardized contract, but not identify individual transactions.
4. TSOs would maintain BEOs, and publish information to facilitate trading in transport capacity. Specifically, information on unsold primary capacity and on capacity that has been sold but not nominated, so available for resale on short-term or interruptible basis.
5. (Requirement that shippers notify TSOs of secondary transport transactions should be clarified or enforced. TSOs could be responsible for publishing aggregate data on these transactions on the BEOs).
6. MO and TSO information provision roles could be combined.



Option 2: OTC Trading and Trading Points

Option 2 maintains all features of Option 1, but introduces regulations to encourage more liquid and transparent OTC trading.

1. Contract delivery points partially standardized to specify delivery at one of 3 or 4 locations where most gas is already traded – e.g. Ballena, Cusiana, La Creciente, and perhaps Barranca
2. MO creates electronic trading platform where traders could make bids and offers for standardized gas products. Traders would see the identity of the party offering to sell or buy gas, volumes, delivery point, duration, and the price bid or offer.
3. Transport capacity sold simultaneously on the same or complementary platform. As above, traders would see the identities of the parties, quantities, duration, and price bid or offer. (TSOs might also be required to sell on this platform).
4. MO would aggregate and publish daily the prices and the volumes that have been traded in gas and transport capacity.

Option 2: Market Maker

Liquidity might be stimulated by mandating a large player (i.e. Ecopetrol) to act as a “market maker” (MM), and/or by mandating the sale of specific volumes of gas, e.g. ‘royalty’ gas, on the OTC platform.

1. MM might be obliged to offer to sell a minimum volume of gas at an advertised price while simultaneously bidding to buy gas at a lower price.
2. MM's bid-ask spread could be capped to provide incentives to “bracket” the “real” market price (i.e. to control market power).
3. MM could support trading of one or more of the standardized gas contracts.
 - British Gas was made MM in the early GB gas market liberalization with a regulated spread between its buy and sell prices
 - mandatory market makers in Denmark and New Zealand electricity markets.
 - big 6 electricity suppliers in GB may be required to offer volumes for a range of electricity products at bid-offer spreads approved by regulator



Option 2: Other Issues

- I. Should trading on OTC platform be voluntary or mandatory? If mandatory, Substagas auctions and selling arrangements outside of the trading platform would no longer be permitted.
 - making the market mandatory would obviously increase liquidity and transparency
 - but if markets are well-designed, traders should want to use them voluntarily and a mandatory market might stifle innovation and further developments
- II. Should producers be allowed to participate on the OTC platform, and if so for which products?
 - producers might be limited to trading only very short-term products for example, but prohibited from offering longer-term contracts
 - if a producer is to be a MM then obviously some producer participation will be required
 - short-term market may also be the obvious place for producers to dispose of any production not sold under longer-term contracts in the primary auctions

Option 3: A Gas Exchange

Option 3 is identical to Option 2 but with the addition of a trading exchange, which may or may not replace the OTC trading platform.

- all trades at the exchange would be cleared, meaning that a central clearing house would act as the counter party to each trade
- e.g. if shipper A purchases gas for delivery at Ballena, he will not know who the seller is, but the MO would know that shipper A had a right to withdraw the contracted amount of gas at Ballena the next day.
- similarly, the MO will know which sellers have an obligation to deliver a matching volume of gas at Ballena during the same period
- membership of exchange would require minimum credit standards and posting collateral (e.g. cash guarantees) to support the difference between the price of a forward product (e.g. a quarter-ahead contract) and the current market value of that forward product. Collateral requirements determined on a daily basis by the MO (or exchange operator)



Option 3: A Gas Exchange ...

- exchange could operate in parallel to the OTC trading platform or, if most traders were willing and qualified to trade on the exchange, the OTC platform could be abandoned in place of the exchange
- trading on the exchange would likely be continuous, but it would also be possible to organize trading in a series of hourly auctions (continuous trading versus periodic auctions is discussed in Tasks 2&3 report)
- exchange would publish the prices and volumes of each of the products traded each day
- same products could be traded as on the OTC market, but international experience suggests that initially only shorter-term (e.g. day-ahead and week-ahead) products) might be traded
- as liquidity on the exchange developed longer-term products could be introduced

Option 4: Single Trading Point or Physical “Hub”

Above options all involve trading contracts with multiple delivery points, i.e. Ballena (on both the TGI and Promigas systems), Cusiana, La Creciente etc

- liquidity could potentially be improved done by concentrating trade at a single location, to avoid splitting trade over several delivery points
- introducing a single trading point also simplifies certain types of “swap” transactions which can increase market efficiency and the gains from trade

We describe two alternative options for doing so:

1. A single physical trading point, or “hub”, in pipeline network which becomes the delivery point in all contracts..
2. Trading contracts which do not specify a location or field, and the MO allocates contracts *ex post*. Essentially equivalent to specifying a “virtual” trading point. Similar to idea described in our auctions' report.



Option 4: Back Haul and a Physical “Hub”

- obvious locations for a physical hub are Ballena (where gas can be delivered into both pipeline networks), or Vasconia (where the two main branches of the TGI system interconnect)
- introduction of a hub creates issue of how producers at other locations put their gas there if they are 'downstream' of it. e.g. if a hub at Ballena, how would Cusiana producers sell their gas there?
- one solution is so-called 'back-haul' products, which would enable a producer to nominate to 'transport' gas against the physical flow of gas – i.e. from Cusiana to Ballena
- back haul makes it possible for all gas to be traded at a single location, which avoids splitting trading between multiple locations and reducing market liquidity
- also makes it much easier for a party with gas at Cusiana to sell gas to a buyer on the Atlantic coast, by facilitating so-called 'swap' transactions.

Option 4: Back Haul and Swaps

Without back haul, a seller at Cusiana could only sell to a buyer in Cartagena by arranging swaps involving one or more other buyers.

- e.g. seller would need to identify a party in Bogotá buying gas at Ballena and arrange a swap so Cusiana gas is sold to Bogotá buyer at the Cusiana price (e.g. \$5.00 per MBTUD)
- Bogotá buyer would then need to sell his Ballena gas to the customer in Cartagena at the same price (e.g. \$5.00 per MBTUD)
- Bogotá buyer would need to purchase transport from Cusiana and sell Ballena-Bogotá capacity, if possible.
- a side-payment might need to be made to the Bogotá buyer/seller to compensate for transport cost differences
- such transactions are complex and could involve organizing swaps between many buyers and sellers simultaneously, e.g. selling 100 units of gas to Cartagena buyer might involve swaps with 4 customers in Bogotá, each purchasing 25 units of gas in Ballena

Such complexity can mean that efficient trades do not occur.

Option 4: Back Haul and Swaps

The physical hub/back-haul product simplifies swaps by having the MO make the “swaps” on behalf of traders.

- all transactions are carried out at the hub at agreed prices, with no need for the parties to arrange swaps
- MO ensures that the physical delivery of the gas matches traders' contractual positions in gas and transport, e.g. from Cusiana to Bogotá and from Ballena to Cartagena

Physical hub/back haul can thus facilitate efficient transactions. However:

- reduces cost reflectivity of (or inconsistent with) point-to-point system
- e.g. shippers in Bogotá need to purchase transport from Ballena, but their gas is from Cusiana
- unclear how to price back-haul capacity, which does not involve any physical flows and is “costless”
- no international consensus on the back-haul pricing and typically priced at some arbitrary fraction of forward capacity

Option 4: Non-location Specific Contracts

Simpler way to improve market liquidity and facilitate efficient swaps would be for products to specify quantities, durations and prices, but not a delivery points (similar to idea presented in auctions report).

- essentially equivalent to specifying a “virtual” trading point
- buyers would commit to supply contracts before knowing which field the gas was coming from
- as in the auctions' proposal, buyers then allocated gas *ex post* from different fields, and MO responsible for ensuring the feasibility of the allocations

May be simpler than physical hubs/back haul (and consistent with point-to-point system) but has drawbacks:

- buyers must purchase gas without knowing transport costs
- buyers might need to rearrange transport capacity on a frequent (e.g. daily or even hourly) basis

Could discourage trade but if proportions of gas received from different fields were stable or predictable, transport cost and contracting issues may not be such a major impediment.

Option 5: Entry-Exit Charges/Virtual Trading Point

Improving liquidity and expanding trading opportunities (Option 4) complex with point-to-point system. Obvious solution would be to adopt entry-exit (EE) charges.

- under an EE system, sellers inject gas into network and sell it to any buyer with exit rights
- no need sell gas at any physical point in the system, since the transport contracts no longer define where the gas flows.
- often described as a Virtual Trading Points (VTP) system since supply contracts no longer specify a physical delivery point
- EE/VTP system could be combined with an OTC trading platform and/or a gas exchange
- only difference is that instead of multiple physical delivery points, contracts would specify 'delivery' at the VTP.
- drawback may be loss of “cost reflectiveness” of transport charges but benefit is improved trading opportunities and market liquidity

Interconnecting two main pipeline networks would make this work better.

Increasing Liquidity

Option 1: Contract standardization; MO established, post-trade transparency; facilitate transport trading

Option 2: OTC trading platform; limited delivery points; capacity trading platform; market maker

Option 3: Reduced counter party risk through exchange trading;

Option 4a: Single delivery point, backhaul product.

Option 4b: No delivery point specified ex ante; average transport costs calculated ex post.

Option 5: Entry-exit system; virtual trading point.

Increasing Cost

