Auctioning Long-term Gas Contracts in Colombia[1]

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Preliminary Draft

1 Summary

This paper presents an approach to auctioning long-term gas contracts in Colombia. I propose an annual auction for long-term firm gas contracts. The auction would assign and price all firm gas contracts, with the exception of gas from the Guajira field, which is assigned administratively at a regulated price. The proposal is a partial market design in that it does not address the transportation of gas from producer to consumer.

The goal of the approach is to improve the transparency and efficiency of the gas market with a coordinated auction for long-term gas contracts. Currently, gas contracts are sold in a fragmented bilateral market. There are no standard contracts and little price transparency. A coordinated auction for standard contracts will reduce transaction costs and improve price formation. An annual auction for firm gas contracts with one to five-year duration allows both sides of the market to manage risks.

Efficient price formation is one of the most important objectives of the gas auction. The simultaneous ascending clock auction is ideally suited to promote efficient price formation. The ascending clock auction provides excellent price discovery and enables demanders to freely arbitrage across the products. This assures that any price difference among products is a reflection of value differences.

My view is that the coordinated auction proposed here will significantly improve the market for firm gas contracts.

2 Introduction

As in most gas markets, the vast majority of Colombia's gas is settled according to firm gas contracts with terms that are much longer than the daily spot market. Firm gas contracts often have durations of one to five years, and sometimes more. These firm gas contracts benefit both supply and demand. Both sides of the market are able to lock in a price, and thereby reduce price risk from the more volatile spot market.

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Unfortunately, the existing firm gas contracting market has high transaction costs, as a result of non-standard contracts, poor price formation, localized contracting, lack of transparency, and other factors.

CREG has proposed an auction for firm gas contracts to address these problems. The goal of the auction is to promote efficient price formation for firm gas contracts. Here I describe how the auction might work. The proposed auction should significantly lower transaction costs as a result of standard contracts and robust price formation in a transparent, national market.

This paper presents a market design covering both the product design and auction design. Product design is the critical first step in the design of any market. It defines what is being traded. Good product design can play an important role in reducing complexity and increasing liquidity in the market. The second step is auction design—how the product is traded.

The paper is organized as follows. First, I discuss the purpose of the market. Then I consider elements of the Colombia gas market that are relevant to product and auction design. Next, I propose a simple product design. Then I turn to the auction design. I conclude with answers to common industry questions.

Many important issues are beyond the scope of this preliminary study. Critical issues of guarantees and credit requirements will be addressed elsewhere. Also the related transport market is only briefly discussed.

3 Purpose of the market

Many objectives must be considered in the design of the gas market. These can be grouped into seven interrelated categories: efficient price formation, transparency, neutrality, risk management, liquidity, simplicity, and consistency.

- *Efficient price formation.* The market should produce reliable price signals based on market fundamentals. It should enhance competition and mitigate market structure problems. It should produce market-based prices for customers, such that any price difference among products reflects value differences.
- *Transparency*. The market should be highly transparent. Bids should be comparable. It should be clear why one bid is accepted and another rejected. It should result in prompt regulatory review and approval, and encourage regulatory certainty.
- *Neutrality*. All suppliers should be treated equally, and all demanders should be treated equally.
- *Risk management*. It should reduce risks for both supply and demand by providing price stability, yet be responsive to long-run market fundamentals. The market should shield participants from short-term transient events, and address counterparty risk.
- *Liquidity*. The market should promote a secondary market, including a liquid market for the primary products, as well as derivative products of shorter term.
- *Simplicity*. The market should be simple for participants, for the auctioneer, and for the regulator.
- *Consistency*. The market should be consistent with the other key elements of the Colombia setting. The most important of these are the transport market and the electricity

market. It also should be consistent with, or improve upon, the best-practice in other gas markets.

Fortunately, these objectives are largely complementary with one another. Hence, it is possible to design the market to satisfy all of these objectives.

4 The Colombia setting

Roughly 90% of Colombia's gas supply comes from two main fields: Guajira on the coast and Cusiana in the interior. Several minor fields account for the remaining 10%. Guajira has about one-half of Colombia's reserves and currently provides 65% of production. The field is operated by Ecopetrol and ChevronTexaco. Cusiana has about 50% of reserves and currently provides 25% of production. The field is operated by Ecopetrol, BP, and Total.

Table 1. Gas supply by company in January 2008

Company	GBTUD	Share	HHI
Ecopetrol	518	62%	3800
Chevron	185	22%	483
BP	53	6%	40
Total	33	4%	15
Pacific Rubiales	27	3%	10
Others	25	3%	9
Total	841	100%	4357

Gas supply in Colombia is highly concentrated. Table 1 shows production by company in January 2008. The Herfindahl-Hirschman Index, HHI, for gas supply is 4357.[3]

Table 2. Gas supply by company and field in January 2008

Field	Location	Company	GBTUD	Share
La Guajira	Coast	Ecopetrol	352	66%
		Chevron	185	34%
Cusiana	Interior	Ecopetrol	129	60%
		BP	53	25%
		Total	33	15%
La Creciente	Coast	Pacific Rubiales	27	100%
Isolated fields	N.A.	Ecopetrol	37	60%
		Others	25	40%

Gas from the Guajira field is assigned administratively at a regulated price. The auction only applies to the unregulated gas coming from other fields. Hence, a more relevant measure of

[3] The U.S. Department of Justice and the FERC, for example, use the HHI for evaluating mergers. A market with an HHI less than 1,000 is considered to be competitive, one with an HHI between 1,000 and 1,800 is considered to be moderately concentrated, and one with an HHI of 1,800 or greater is considered to be highly concentrated. To compute the HHI, one sums the squares of the sellers' market shares. The HHI can range from a minimum of close to 0 to a maximum of 10,000. An HHI approaching zero would indicate near-perfect competition, with many thousands of sellers with negligible market shares. An HHI of 10,000 indicates a single firm with 100% market share.

concentration is that of the Cusiana field. Table 2 shows production by company and field. HHI for the Cusiana field is 4446—about the same as for all of the fields combined.

Demand for gas falls into four categories: residential and commercial (19%), industrial (45%), electricity (24%), and vehicles (11%). Demand is located on the coast (34%) and the interior (52%). In addition, currently 14% of demand is an export to Venezuela. On the coast, about 49% of demand is to generate electricity. The interior also has significant gas-fired generation capacity, but these units generate little electricity in a typical year, since hydro resources are less expensive whenever there is sufficient water

Table 3. Firm gas contracted in January 2008

Company	Type of Company	GBTUD	Share	HHI
e2 Energia Eficiente	Marketer	121.96	13%	166
Gas Natural	Local distribution company	105.20	11%	124
Gecelca	Thermal generator	100.00	11%	112
Refinería Barrancabermeja	Refinery	90.00	10%	90
Empresas Publicas de Medellin	Thermal generator	69.60	7%	54
Isagen	Thermal generator	59.00	6%	39
Termoflores	Thermal generator	52.87	6%	31
Termoyopal	Thermal generator	46.72	5%	24
Cementos Argos	Industry	36.00	4%	14
Empresa de Energia del Pacifico	Thermal generator	36.00	4%	14
Merilectrica SCA	Thermal generator	32.80	3%	12
PDVSA Gas	Export	32.80	3%	12
Abonos Colombianos	Industry	20.50	2%	5
Cerromatoso	Industry	16.00	2%	3
Termoemcali I SCA	Thermal generator	16.00	2%	3
Refineria Cartagena	Refinery	14.94	2%	2
Empresas Públicas de Medellín	Local distribution company	12.30	1%	2
Termoflores (Flores III)	Thermal generator	10.53	1%	1
Central Hidroeléctrica de Caldas	Local distribution company	9.62	1%	1
Ecopetrol	Producer	9.14	1%	1
Dinagas	Marketer	9.10	1%	1
Alcanos de Colombia	Local distribution company	8.10	1%	1
Termoflores (Flores II)	Thermal generator	7.37	1%	1
Perenco Colombia	Producer	5.24	1%	0
Gases del Llano	Local distribution company	4.50	0%	0
Mansarovar Colombia Energy	Industry	4.50	0%	0
Drummond Limited Sucursal Colombia	Industry	4.35	0%	0
Fertilizantes Colombianos-Ferticol	Industry	2.50	0%	0
Petrobras Colombia	Producer	2.40	0%	0
Cemex Colombia	Industry	2.10	0%	0
Gas Natural de Cesar	Local distribution company	0.88	0%	0
Gases del Cusiana	Local distribution company	0.85	0%	0
Madigas Ingenieros	Local distribution company	0.60	0%	0
Gases del Caribe	Local distribution company	0.60	0%	0
Estación de Bombeo Monterrey	Industry	0.55	0%	0
Termocoa	Thermal generator	0.40	0%	0
Surtigas	Local distribution company	0.18	0%	0
Enerca	Local distribution company	0.16	0%	0
Proviservicios	Local distribution company	0.09	0%	0
	Total	946.45	100%	714

The market for firm gas is unconcentrated on the buyer side. Table 3 shows firm gas contracted in January 2008. The total of all contracts exceeds production, because some quantity, especially from thermal generators was not taken. The HHI of 714 is an underestimate, since

some of the companies listed have the same owner, but nonetheless firm gas remains unconcentrated on the buyer side.

Transport of gas currently occurs at distance-based regulated prices intended to cover pipeline costs. This approach is satisfactory if the pipelines are unconstrained. However, pipelines often are constrained. Congestion-based pricing likely is needed to assure that pipeline demand is consistent with capacity.

Current gas contracts are mostly take-or-pay with a high minimum percentage over the month or year (often 100%). Most contracts are for one or two years, although there are some that are much longer. There is a large variety of contracts.

Currently there is no LNG capability in Colombia. Also there is no storage.

5 An auction proposal

The first question to ask is whether the auction will be mandatory for producers or voluntary. Mandatory means that producers sell all their long-term contracts in the auction; whereas, voluntary would allow producers to also sell long-term gas contracts bilaterally. I think it is important that participation by producers be mandatory. Mandatory participation guarantees that all demand will participate in the auction. Mandatory participation also enhances transparency and improves the price signal.

The second question is the scope of the auction. Separate auctions could be conducted for each producer and field. However, given that most of the auctioned volume would come from Cusiana, I think it would be desirable to conduct a single auction event including all auctioned fields and producers. This would allow buyers to see at one time all the options for long-term gas contracts. More importantly, the proposed format would allow bidders to arbitrage across the substitute products, enhancing price formation and reducing transaction costs.

5.1 Product definition

The product is a take-or-pay contract for firm gas with a duration of one or more years. I recommend that the producers work with gas demanders and CREG to establish a standard contract for long-term gas. The contract would specify:

- The delivery point, for example Cusiana.
- The minimum percentage of take on a monthly or yearly basis, and the cap on the rate of take.
- The start date and duration.
- Whether and how the price is indexed.
- The lot size.
- The guarantees and penalties.

The benefits of a standard contract are substantial. A standard contract simplifies the market by reducing the number of products. This reduces transaction costs, increases liquidity, and enhances the secondary market. Transparency and price formation are improved. Both buyers and producers will benefit from the use of standard contracts.

Establishing guarantees and penalties is beyond the scope of this study. They are, however, crucial to the success of the market. They also are interrelated with the product design. For example, contracts of longer duration require larger guarantees. Thus, the choice of a longer-term contract needs to reflect the tradeoff between reduced price risk and the cost of a larger guarantee.

Guarantees should be kept as small as possible and still satisfy a high level of security from counterparty risk.

To limit inflation risk, I recommend that for multi-year contracts that the price be indexed for inflation, using the Colombian Producers' Price Index (IPP) or another suitable index.

I recommend a small lot size, say 10 MBTU/d. This gives buyers great flexibility in expressing quantity.

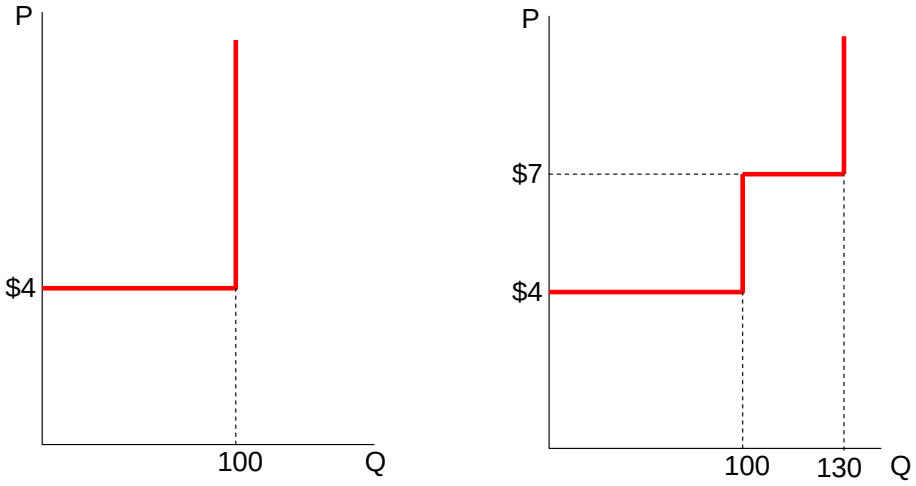
I recommend durations from 1-year to 5-year. Some buyers may prefer even longer durations. However, I doubt that suppliers would be willing to offer firm gas at attractive prices with such long durations given the uncertainties of supply.

An annual auction event is appropriate for the auctioning of long-term firm gas contracts. It would be possible to conduct auctions more frequently, such as twice-a-year or quarterly, but I think that the needs of market participants can best be met with a single annual auction.

5.2 Supply

Before the auction, each producer announces its supply schedule—the quantity offered for each product. The supplier specifies a reserve price below which it will not sell any quantity. The supplier may offer additional quantity at higher prices. Figure 1 gives an example of two supply schedules. In the first, the producer offers 100 lots with a reserve price of $4: at all prices at or above $4 the producer sells 100 lots. In the second example, again the producer offers 100 lots with a reserve price of $4, but this time the producer offers an additional 30 lots if the price is $7 or more. The supplier's reserve price should equal its opportunity cost, typically calculated as the opportunity to sell the gas at a future time.

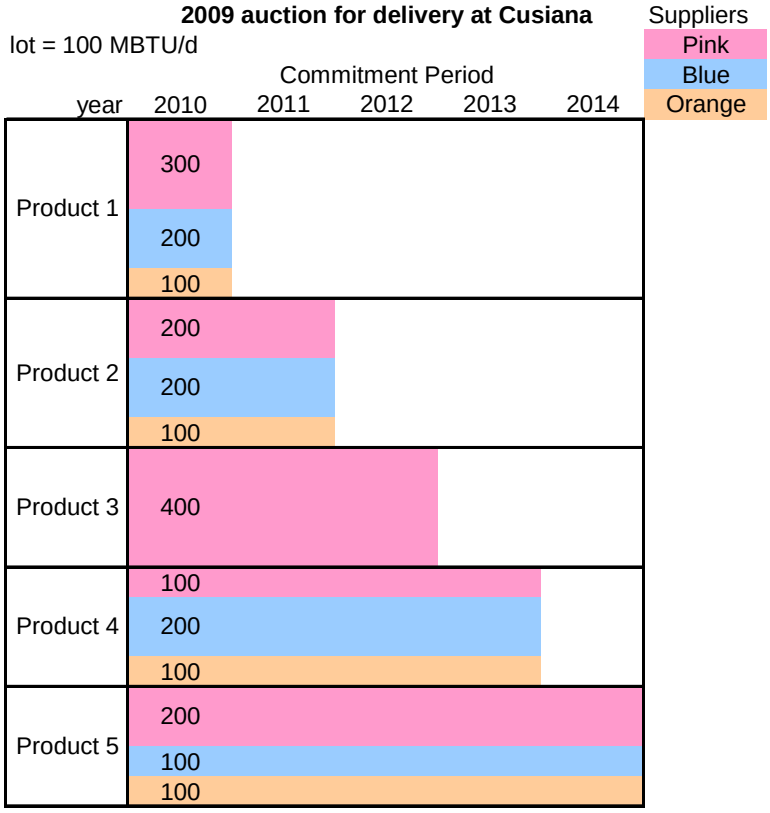
Figure 1. Sample supply schedules for a producer



The supply schedules for each producer are combined to form the aggregate supply schedule, which gives the total quantity offered for each product as a function of price. It is the announcement of the supply schedules that motivates the buyers to participate in the auction. With this information, the buyers can prepare for the auction—assessing needs, developing strategy, and securing guarantees.

The auction works best if the products offered are close substitutes. Figure 2 shows a sample supply of products for the 2009 auction for delivery at Cusiana. There are three suppliers, Pink, Blue, and Orange, each offering quantity for up to five products. The products differ only in duration. All products start in 2010 with durations from 1-year to 5-year. The quantities are the maximum quantities, assuming all reserve prices are met. For the 1-year product, Pink is offering 300, Blue 200, and Orange 100. Any buyer of a product would win quantity from all producers in proportion to the quantity offered by each supplier. Thus, a buyer winning 6 lots of product 1 would get 3 lots from Pink, 2 lots from Blue, and 1 lot from Orange.

Figure 2. Sample supply of products

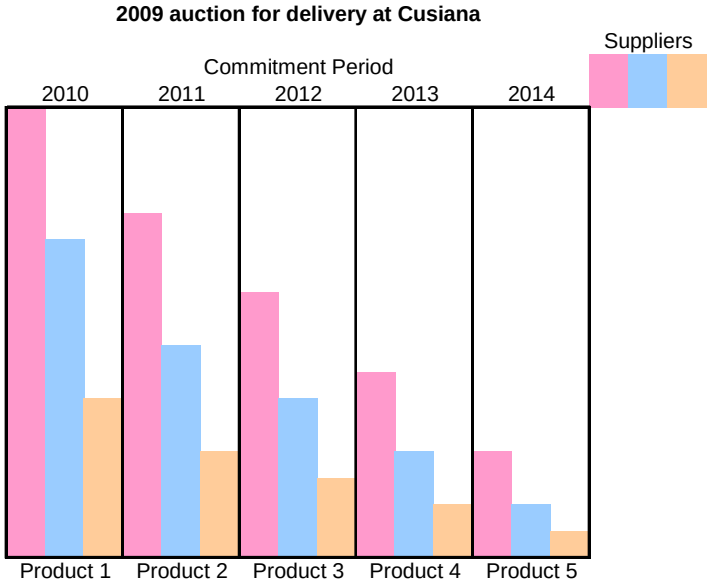


Each producer decides before the auction how it wishes to split its quantity among durations and establish its reserve prices. There is no requirement that quantity be offered for all products or in any particular proportion. And there is no requirement that different producers have the same reserve price. Nonetheless, each producer has an incentive to offer products that the buyers will find attractive. Thus, if buyers are willing to pay a premium for longer durations, producers should be willing to offer more quantity with longer durations.

Importantly, with the recommended structure of products, as shown in Figure 2, all the products are close substitutes from a buyer's point of view. The reason is that all the products satisfy the buyer's most immediate need of providing firm gas in the year 2010. A simultaneous auction in which all the products are strong substitutes can be expected to have excellent price formation.

In contrast, Figure 3 shows an alternative arrangement in which the products are defined as firm gas in a particular year. I do not recommend this structure. The reason is that with this structure the products are complements for the buyer, not substitutes. 2011 firm gas is not a substitute for 2010 firm gas. Auctions for complements generally have more challenging price formation, than auctions for substitutes.

Figure 3. Alternative with supply by year



New quantity will become available each year, as prior contracts expire, as production capacity expands, and as producer uncertainty about future production is resolved.

5.3 Auction design: simultaneous ascending clock auction

The proposed auction design is a simultaneous ascending clock auction, similar to the firm energy market (see Cramton and Stoft 2007) and the organized market for forward energy (see Cramton 2007). There are two important differences. First, prices ascend, rather than descend, since buyers are competing to purchase gas contracts. In the other auctions suppliers are competing to sell. Second, there are more products, reflecting multiple delivery points and multiple durations. Multiple substitutable products are readily handled within the ascending clock auction. As in the forward energy auction, bids at the clearing price may be rationed in this auction in order to balance supply and demand. This simplifies auction clearing.

The motivation for using a dynamic auction, rather than a sealed bid auction, is explained in detail in Cramton (1998) and Ausubel and Cramton (2004). In brief, the approach allows price discovery: bidders can learn from the bidding process and condition their bids on this information. This is especially useful when there are many products, as is the case here. Then the

bidders can freely arbitrage across the products. This arbitrage improves auction efficiency. Competitive market prices are determined for each product. In particular, the price separation between any two products reflects the difference in the value of demand.

The ascending clock auction is an especially simple and powerful dynamic auction. In each round, the auctioneer announces a price for each product. Each bidder then indicates its desired quantity for each of the products at the current prices. In subsequent rounds, the price increases for each product with excess demand. The bidders then again express the quantity of each product desired at the new prices. This process is repeated until there is no excess demand of any product.

Figure 4. An ascending clock auction

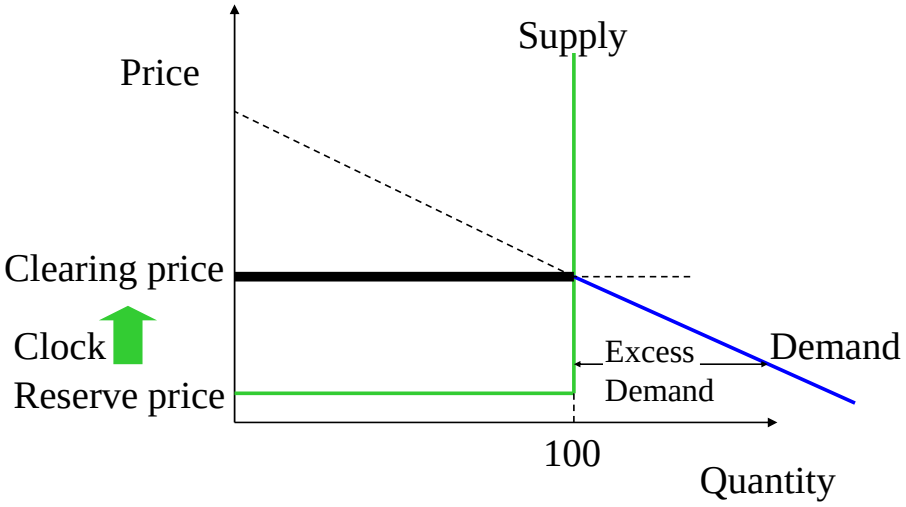
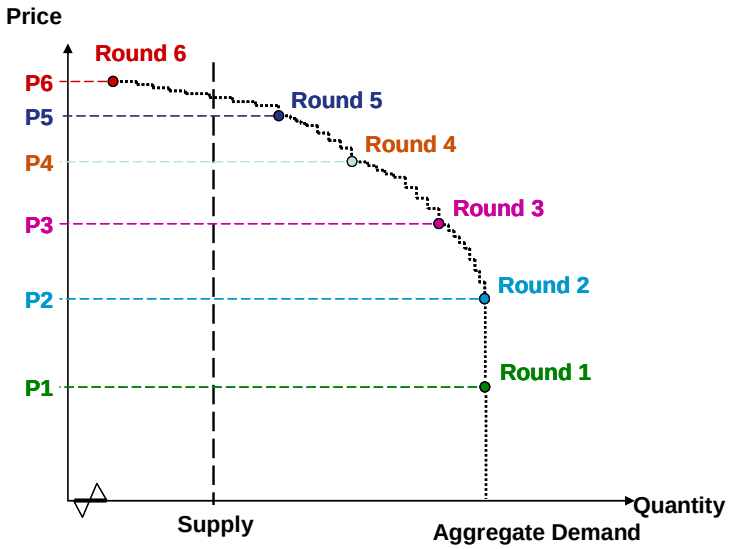


Figure 4 illustrates an ascending clock auction for a single product. The price starts at the reserve price where there is substantial excess demand. As the price rises the aggregate demand curve is revealed. As prices rise, demand falls. The process continues until demand equals supply. Each bidder wins its quantity at the clearing price and pays the clearing price for all lots won. This is a dynamic version of a uniform-price auction.

In practice it is desirable to have discrete rounds. Figure 5 shows how this works, again for a single product. Whenever a bidder reduces its quantity, the bidder states the exact price of the reduction. Thus, the aggregate demand curve typically has a number of small steps between the prior round price and the current round price, where each step is a particular reduction in quantity by one of the bidders.

Figure 5. Discrete rounds in an ascending clock auction



For the ascending clock auction to work as intended, it is important for the starting prices to be set sufficiently low that it creates significant excess demand. Setting starting prices too low causes little harm. It is competition among the bidders that determines the clearing prices. The low starting prices will quickly be bid up, unless there is insufficient competition, which is unlikely in this context. In contrast, setting starting prices too high can damage the auction. I recommend that the starting price for each product be set at the lowest reserve price among the producers.

An activity rule in a dynamic auction is intended to enhance price discovery by motivating each bidder to bid throughout the auction in a manner that is consistent with the bidder's true preferences. To the extent that bids better reflect each bidder's true preferences, prices are more apt to progress in a manner consistent with final competitive prices. This allows bidders to focus their decision-making attention on more realistic packages of items, improving bidder decision making.

The need for an activity rule in a dynamic auction is seen in the tendency of sophisticated bidders in eBay auctions to bid snipe. Bid sniping is waiting until the last minute before submitting a bid. There are numerous reasons for this common behavior, but one of the most frequent is a desire to prevent other bidders from responding to your bid. If all bidders bid snipe, then the dynamic auction becomes a sealed-bid auction and all the benefits of price discovery are lost.

Fortunately, there is a simple and general activity rule for this setting.

Activity rule: *A bidder can only maintain or reduce aggregate quantity as prices rise. That is, the bidder must bid a (weakly) downward sloping aggregate demand curve throughout the auction.*

Note that this activity rule imposes no restriction on the ability of the bidder to arbitrage across the products—the restriction is with respect to the aggregate quantity demanded, not the

quantity for any individual product. Since the products are close substitutes this flexibility is appropriate.

Figure 6 illustrates how the auction works with many products. The top row indicates the supply offered for each of the five products. For simplicity, I have assumed that each product has the same starting price of $5. At this low price, all but one of the products has excess demand; only the 3-year product does not. As a result, for round 2, the price increases for all products, except the 3-year product. Notice that the 1-year and 5-year products increase slightly faster, since these products had greater excess demand. In round 2, overall demand is the same as in round 1 at 3900 lots. No bidder has reduced demands. However, bidders did switch some quantity from one product to others. As a result, at the end of round 2 there is excess demand for all products, and so all products have higher prices in round 3. By round 9, we have supply and demand balance for four of the five products; only the 3-year product has excess demand. Thus, in round 10, only the 3-year product has a higher price. All products clear, and the auction ends, when the 3-year price reaches $7.85 and there is a reduction of 50, causing demand to match supply.

Figure 6. An auction with many products

2009 auction for delivery at Cusiana
all contracts start in 2010; lot = 100 MBTU/d; price = US$/MBTU

Excess demand
No excess demand

		1-year	2-year	3-year	4-year	5-year	Total
Round	Supply	600	500	400	400	400	2300
1	Price	$5.00	$5.00	$5.00	$5.00	$5.00	
	Demand	1200	800	300	700	900	3900
2	Price	$5.50	$5.40	$5.00	$5.40	$5.60	
	Demand	1000	900	600	600	800	3900
3	Price	$5.90	$5.90	$5.50	$5.80	$6.00	
	Demand	900	900	600	550	750	3700
…							
9	Price	$7.60	$7.80	$7.70	$7.90	$7.90	
	Demand	600	500	450	400	400	2350
10	Price	$7.60	$7.80	$7.85	$7.90	$7.90	
	Demand	600	500	400	400	400	2300

In general, as a result of switching or reductions, it would be possible for a product to go from excess demand to excess supply. This, however, is prevented in the auction rules. First, reductions are only accepted to the point where demand equals supply. Thus in round 10, if a bidder made a reduction of 75 at the price of $7.85, then in fact only the first 50 of the reduction is accepted (the amount of excess demand). The price is stopped at $7.85, the price of the reduction. Second, switches are similarly restricted to prevent excess supply. With these restrictions, once a product has excess demand, it is guaranteed that the product's full quantity will be sold.

Notice that the total quantity across all products declines monotonically throughout the auction. This is implied by the activity rule.

The simultaneous ascending clock auction has many important advantages. Chief among these advantages are price and assignment discover. Buyers can build a desired portfolio of products given prices that best fits their needs.

An important requirement of any dynamic auction is that the auction can be "price only," in the sense that all contract matters are resolved except for price. Thus, the auction will identify who the winners are and what prices will be paid. This requires that each buyer perceives that there are no substantial differences among sellers, and similarly that each seller perceives that there are no substantial differences among buyers. The most common source of difference is counterparty risk. Thus, it is important that the policy for guarantees and penalties is such that differences in counterparty risk are minimized.

The information policy determines who knows what in the auction. As mentioned, each producer announces its supply schedule for each product before the auction. Starting prices are also reported. At the end of every round, the auctioneer reports at a minimum: 1) the excess demand for each product, 2) the prices for the next round. Additional information such as the quantities bid by each bidder may also be reported. This information may be helpful for some in assessing likely transport bottlenecks.

5.4 International experience

The approach proposed here for long-term gas contracts is consistent with international best-practice. In the last five years, there have been many long-term gas auctions using an ascending clock format. These auctions were either single events or annual auctions as indicated below:

- German gas release program (E.ON Ruhrgas); series of six annual auctions (2003 – 2008)
- Hungary gas release program (E.ON Ruhrgas); series of five annual auctions (2006 – 2010)
- Danish Oil and Natural Gas gas release programme; series of six annual auctions (2006 – 2011)
- Gaz de France gas storage auction; single auction (Feb 2006)
- Gaz de France gas release programme; single auction (Oct 2004)
- Total gas release program; single auction (Oct 2004)

These auctions occurred in four separate countries. All were conducted with regulatory oversight.

Since 2001, similar auctions have been conducted for various long-term electricity products. These auctions have occurred in the U.S., several European countries, Colombia, and Brazil.

It is my view that the design presented here is consistent with the best practices elsewhere.

5.5 Variations

Variations in the auction format are certainly possible. One variation adopted by Ecopetrol for one of its auctions used standard e-sourcing software from SAP to conduct an auction for a single product. The approach is similar to the ascending clock auction, except that there are tentative winners throughout the auction (those with the highest current bids up to the supply available). Tentative losers may displace the current winners by bidding quantity at a higher price. The auction continues until there is a period of ten minutes (or some other time window) in which no bid is placed. An advantage of this approach is its simplicity and the ability to use standard e-sourcing software to conduct the auction. A disadvantage of the approach is that it appears limited to auctioning a single product at a time. In addition, the price discovery is

inferior, because of the absence of a meaningful activity rule. Bidders can bid snipe. Extending the approach to multiple products may be possible. However, the absence of a meaningful activity rule will undermine price discovery, which is especially important when auctioning many related products.

5.6 Organization

I recommend that the producers jointly implement a single annual auction event. This will yield the best price formation. The auction can be conducted by an independent auctioneer retained by the producers. The auction should be developed and conducted with regulatory oversight.

5.7 What if a seller is also a buyer?

It is straightforward to handle the situation where a seller is also a buyer, for example, as in the case of Ecopetrol buying gas for use in its refinery operations. The simplest approach is for the seller to announce its supply schedule, just like any other seller, and in addition announce its demand schedule. Both announcements are made before the auction starts. The seller is a price taker for the quantity it wins, paying the clearing price. This is equivalent to the seller removing the quantity it buys from its supply schedule.

5.8 Priority for internal demand

The resolution includes a priority for internal demand. This can be implemented at the conclusion of each annual auction as follows. If at the clearing price an export wins quantity, then losing internal demand has the right of first refusal to displace the export. The right of first refusal is granted in order of quantity reductions with the last to reduce given the first opportunity to exercise the right of first refusal.

An important benefit of this approach is that the clearing prices do not change. The only change is the possibility that some export quantity may be displaced by internal demand. This means that no subsidy or revenue source is required to give priority to internal demand.

If the demand side is highly competitive then it is unlikely that the right of first refusal will displace any exports, since the losing internal demand has already rejected the price paid by exports as too high. However, the right of first refusal does give internal demand some advantage in other instances.

5.9 Addressing market power

Two features of the proposal are intended to address market power concerns. First, the seller must commit to its supply schedule before the auction starts. This prevents the seller from adjusting its offer in response to revealed buyer demands during the auction. Second and perhaps more importantly, the auction is an open and transparent process with regulatory oversight. The auction will be monitored for any apparent exercise of market power. In the event of market power abuse, additional steps can be taken, such as placing a cap on the reserve prices of producers.

5.10 Secondary market

There are two types of secondary markets: one for long-term gas contracts and one for spot transactions.

The spot market for gas typically is a day-ahead market in which both producers and demanders can balance their positions based on the latest information. Producers can participate in the spot market.

In contrast, the bilateral trade of long-term gas products should be limited to demanders, not producers. This restriction on producers is needed in order to make the auction mandatory for producers. Otherwise, producers could sell some or all of their long-term gas in bilateral markets, bypassing the auction.

One further way to enhance transparency in the market is to establish a registry of contracts. All the auctioned contracts would be included in this registry, but additionally the registry would reflect any change as a result of bilateral trade. One advantage of a registry of contracts is that it could help market participants better understand supply and demand by location, and hence the likely bottlenecks in the pipeline network.

6 Transport

As mentioned earlier, the proposed auction does not address transport. A buyer requires firm gas *and* transport from the supply delivery point to the buyer's demand location. In the event that the pipeline network is unconstrained then the required capacity on the network is readily purchased at the regulated price. However, it is likely that some pipeline elements will be constrained at least in the shortrun until enhancements to the network can be made.

In the event of congestion, ideally both firm gas and transport can be purchased at the same time, where the transport price reflects the congestion price. This, however, would lead to a complex auction, one that I view is too complex to develop in the near term.

Absent a simultaneous auction of both firm gas and transport, a buyer has two options: buying firm gas and then securing pipeline capacity after the auction, or buying transport capacity first and then participating in the auction for firm gas. Both of these options involve a chicken-and-egg problem for the buyer. Neither is ideal, but both are workable in the near term. Nonetheless, it will be important to better address the transport issue in subsequent work.

7 Industry questions

[To be written after industry has had an opportunity to comment on the proposal.]

8 Conclusion

The proposed auction of firm gas promises to reduce transaction costs and improve efficiency in the market for long-term gas contracts.

Efficient price formation is one of the most important objectives of the firm gas auction. The simultaneous ascending clock auction is ideally suited to promote efficient price formation. The ascending clock auction provides excellent price discovery and enables buyers to freely arbitrage across the products. This assures that any price differences among products reflect value differences.

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