Colombia’s Natural Gas Market

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Goal

• Improve transparency and efficiency of gas market with coordinated auction for long-term gas contracts
Objective of auction

• Efficient price formation
• Transparency
• Neutrality
• Risk management
• Liquidity
• Simplicity
• Consistency
Efficient price formation

- Reliable price signals based on market fundamentals
- Competitive prices
Transparency

• Open process
• Bids are comparable
• Clear why winners won
• Prompt regulatory review and approval
• Regulatory certainty
Neutrality

• All suppliers treated equally
• All demanders treated equally
Risk management

• Reduces risk for both sides of market
• Price stability, yet responsive to long-term market fundamentals
• Shields from transient events
• Addresses counterparty risk
Liquidity

• Promotes secondary market
• Liquid market for primary products
• Liquid market for derivative products
  – Long-term strips
  – Short-term slices
Simplicity

- For participants
- For auctioneer
- For regulator
Consistency

- Consistent with other key elements
  - Transport market
  - Electricity market
    - Spot energy market
    - Firm energy market

- Consistent with best practice in world
Colombia Setting
Supply

All numbers are approximate

• Two main fields
  – Coast (Guajira)
    • 50% of reserves; 65% of production
    • Ecopetrol; Chevron
  – Interior (Cusiana)
    • 50% of reserves; 25% of production (but growing)
    • Ecopetrol; BP; Total

• About 10 years of proven reserves
Demand

• Type
  – Residential-commercial 19%
  – Industrial 45%
  – Electricity 24%
  – Vehicles 11%

• Location: 34% coast; 52% interior; 14% Ven.
  – Coast: 49% of demand is electricity
  – Interior: little electricity in typical year (more capacity),
    two large LDC
Transport

- Distance-based regulated price
- Often constrained
- How to make assignment consistent with transport constraints?
Contracts

• Mostly take-or-pay with high minimum percentage over month or year
• Mostly 1 or 2 year, but some 10-15 year
• Large variety of contracts
• Bilateral market is not transparent
Other features

• No LNG
• No storage
• Regulated price on coast
• Market price in interior
CREG proposal

- Producers declare quantity
  - Reserves
  - Potential production
  - Production available for market

- Mechanism for assigning quantity
  - Administrative for those with regulated price
  - Auction for remaining demand
Auction proposal
Mandatory participation by producers

- Mandatory: Producer sells all long-term contracts in auction
- Voluntary: Producer may sell long-term contracts in bilateral market
- Mandatory participation guarantees that all demand will participate in auction
- Mandatory participation enhances transparency and improves price signal
Auction scope

• Nation, region, field (delivery point), producer
• Different delivery points with same contract period are close substitutes (especially if near by)
• Same delivery point with overlapping contract period are close substitutes
• Close substitutes should be auctioned at same time to facilitate arbitrage and reduce transaction costs
Product definition

• Delivery point (e.g., Cusiana)
• Firm gas
• Take-or-pay
  – Minimum percentage (monthly or yearly)
  – Cap on rate of take (hourly or daily)
• Indexed
• Duration
• Lot size
• Guarantees and penalties
Standard contract

- Simplifies market (fewer products)
- Reduces transaction costs
- Increases liquidity
- Enhances secondary market
- Improves transparency
- Benefits sellers and buyers

*Producers work with buyers and CREG to establish standard contract.*
Auction

- Producers offer supply schedule
  - Quantity offered for each product
  - May offer more at higher prices
  - Announced before auction starts
  - Royalty quantity offered on same terms

- All products that are close substitutes are in the same auction
Sample supply schedules

Offer 100 lots with reserve price of $4

Offer 100 lots with reserve price of $4, and 30 with reserve price of $7

Reserve price should equal opportunity cost (opportunity of selling gas at future time)
Supply example

2009 auction for delivery at Cusiana

Products only differ in duration; all start in 2010

Seller decides split among durations before auction

lot = 1000 MBTU/d

<table>
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<tr>
<th>Product</th>
<th>Year</th>
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Buyer winning 6 lots gets 3 pink, 2 blue, 1 orange.

Product 2

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Alternative: Supply by year

*Not recommended*

2009 auction for delivery at Cusiana

<table>
<thead>
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<th>Commitment Period</th>
<th>Product 1</th>
<th>Product 2</th>
<th>Product 3</th>
<th>Product 4</th>
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Products are not substitutes for buyers.

Suppliers
Annual auction event

• Annual auction well-suited to long-term contracts (one or more years)

• Producers offer all quantity
  – Capacity less existing firm gas contracts
  – Each year new quantity becomes available
    • Expiring contracts
    • Capacity expansions

• Auction by field or region (e.g. interior)
Simultaneous ascending clock auction

- Separate price for each product
- Demanders express quantity for each product given prices
- Prices rise for products with excess demand
- Auction ends when no excess demand
- Activity rule: bidder’s aggregate quantity declines as prices rise

Auction determines market price for each product.
Ascending clock auction:
All bids above clearing price win and pay clearing price
Ascending clock auction
Sample auction

2009 auction for delivery at Cusiana
all contracts start in 2010; lot = 1000 MBTU/d; price = $/MBTU

<table>
<thead>
<tr>
<th>Round</th>
<th>Supply</th>
<th>1-year</th>
<th>2-year</th>
<th>3-year</th>
<th>4-year</th>
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<td>900</td>
<td>600</td>
<td>550</td>
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Ascending clock has important advantages

- Price and assignment discovery
- Buyers can build desired portfolio of supply across products given prices
- Assumes “price only” auction
  - All other features are same
    - No substantial difference among sellers
    - No substantial difference among buyers
    - Credit differences addressed with guarantee policy established before auction starts
Activity rule

- A bidder can only maintain or reduce its aggregate quantity (total number of lots) as prices rise
- Allows full substitution among products
- Avoids bid sniping and improves price discover
Information policy

• Supply schedule and starting prices announced before auction

• After every round, auctioneer reports (at least)
  – Excess demand for each product
  – Prices for next round
    (determined from extent of excess demand)
International experience

All use ascending clock auction to sell long-term gas contracts

- 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)
Organization

- Producers jointly conduct auction
- Independent auctioneer
- Regulatory oversight
What if seller is also buyer?

- Seller announces supply schedule (like others)
- Seller is a price taker for quantity it buys
- Quantity it buys is effectively removed from supply schedule
Priority for internal demand

• If at clearing price export wins quantity, losing internal demand has right of first refusal to displace export

• Right of first refusal granted in order of quantity reductions (last to reduce first)

• Clearing prices do not change; only change is some export quantity may be displaced by internal demand
Addressing market power

• Open and transparent process
• Seller must commit to supply schedule before auction starts
• Auction watched for exercise of market power
• Additional steps taken as needed, such as cap on reserve price
Secondary market

• Bilateral trade of long-term products among demanders, not producers
• Day-ahead market to balance positions
Transport

• Auction does not address transport
• Buyer requires firm gas + transport
  – Ideally, both are purchased at same time and transport price is congestion price
  – With gas purchased first, auction outcome may violate transport constraints
  – With transport purchased first, transport may be inconsistent with auction outcome
Approaches to improve transparency

- Require standard contracts
- Establish registry of contracts
  - Parties and terms disclosed
  - Implied supply and demand by location, and supporting pipeline flows
Questions