

# 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

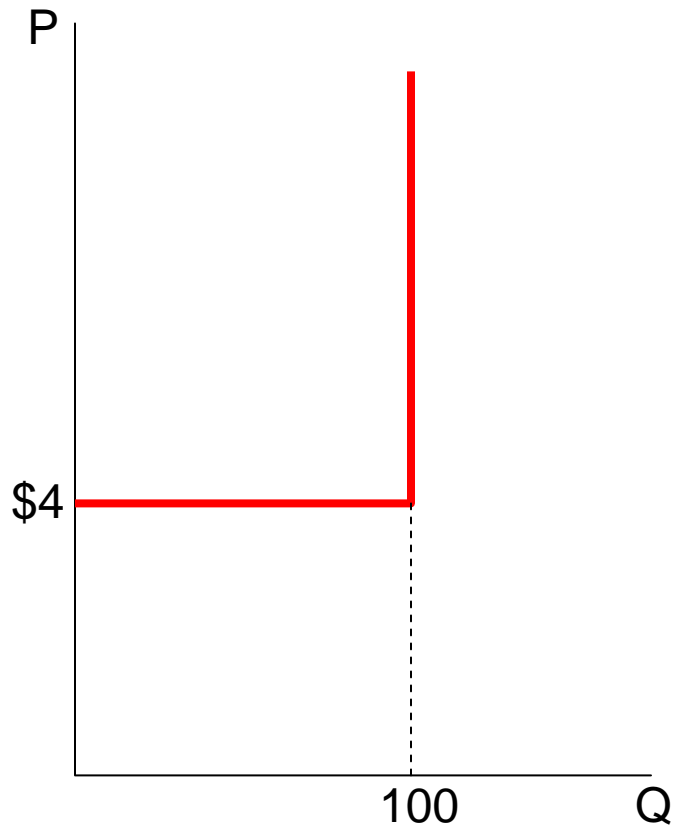
*Producers work with buyers and CREG to establish standard contract.*

# Auction

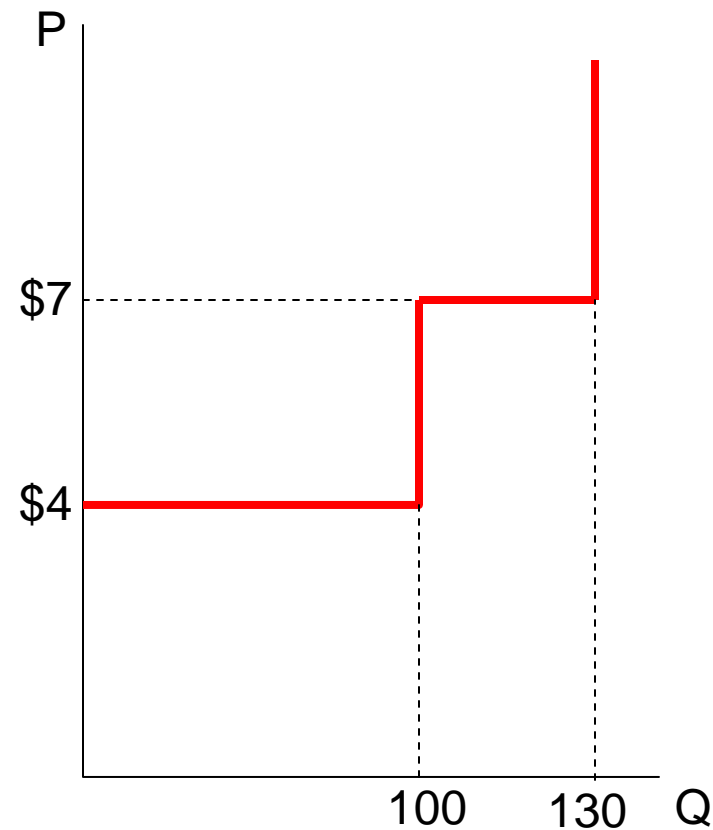
- Producers offer supply schedule
  - Quantity offered for each product
  - May offer more at higher prices
  - Announced before auction starts
  - Royalty quantity offered on same terms
- All products that are close substitutes are in the same auction

# 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

lot = 1000 MBTU/d

Suppliers

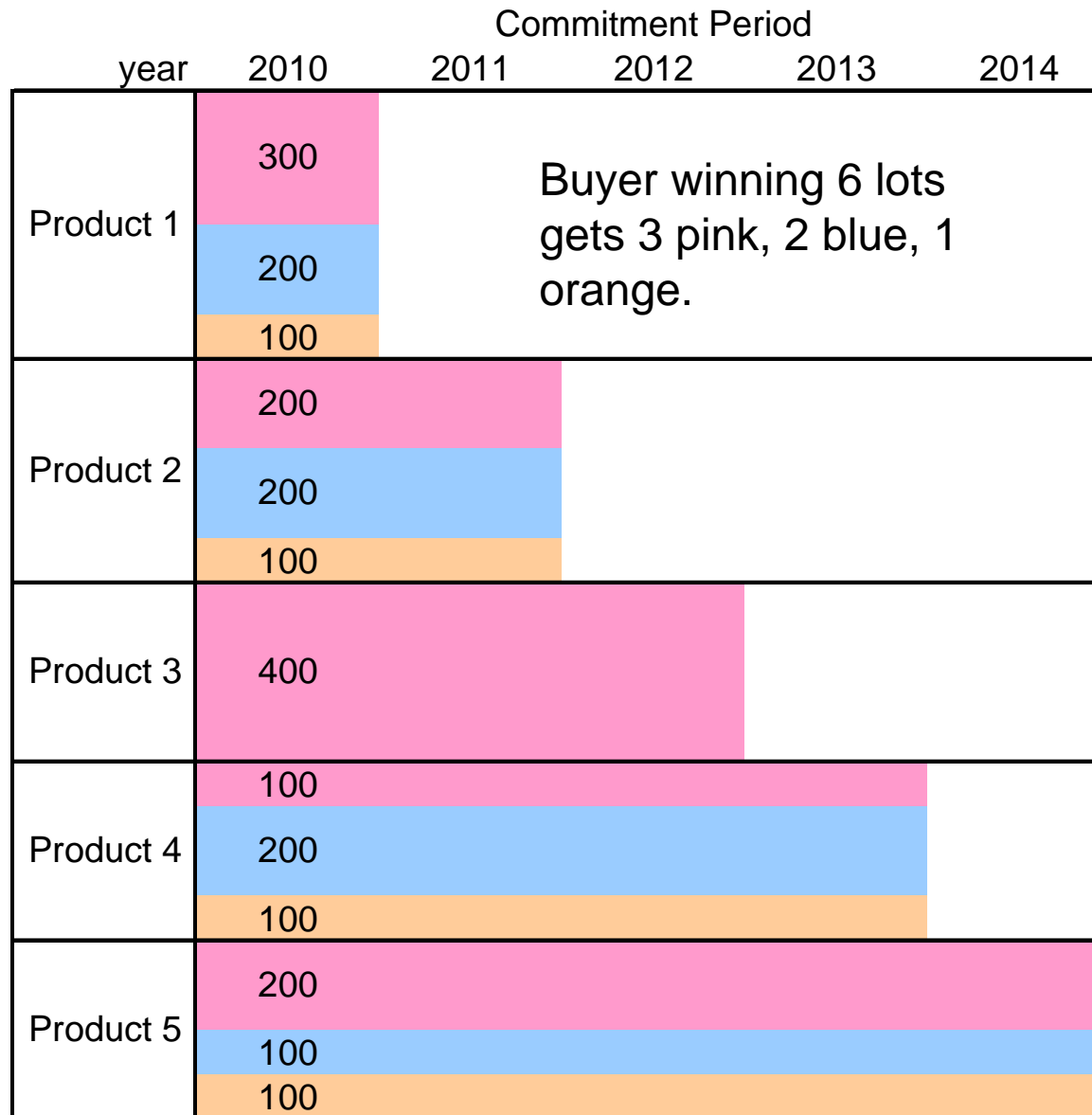
Pink

Blue

Orange

Products only differ in duration; all start in 2010

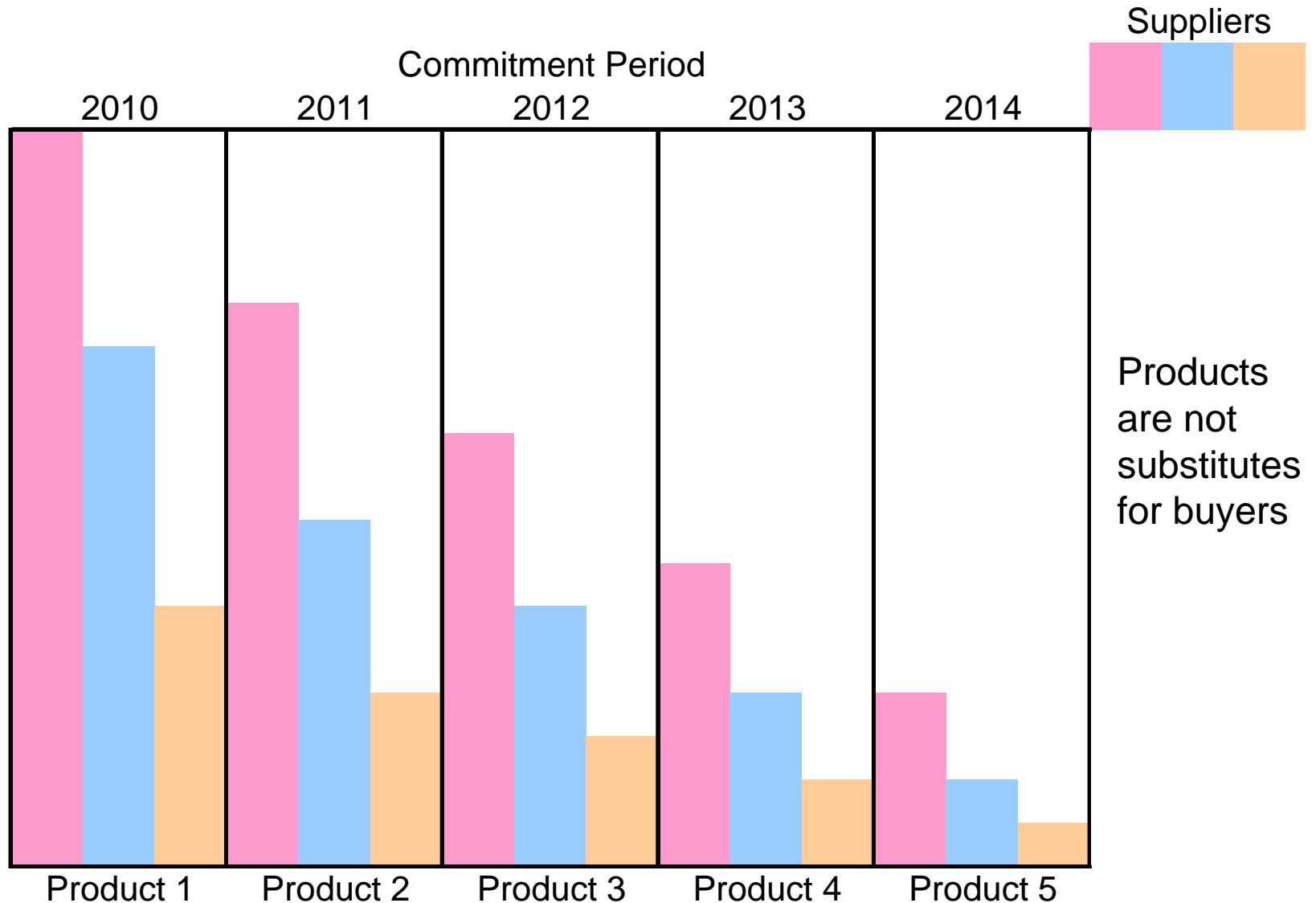
Seller decides split among durations before auction



# Alternative: Supply by year

*Not recommended*

2009 auction for delivery at Cusiana



# 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)

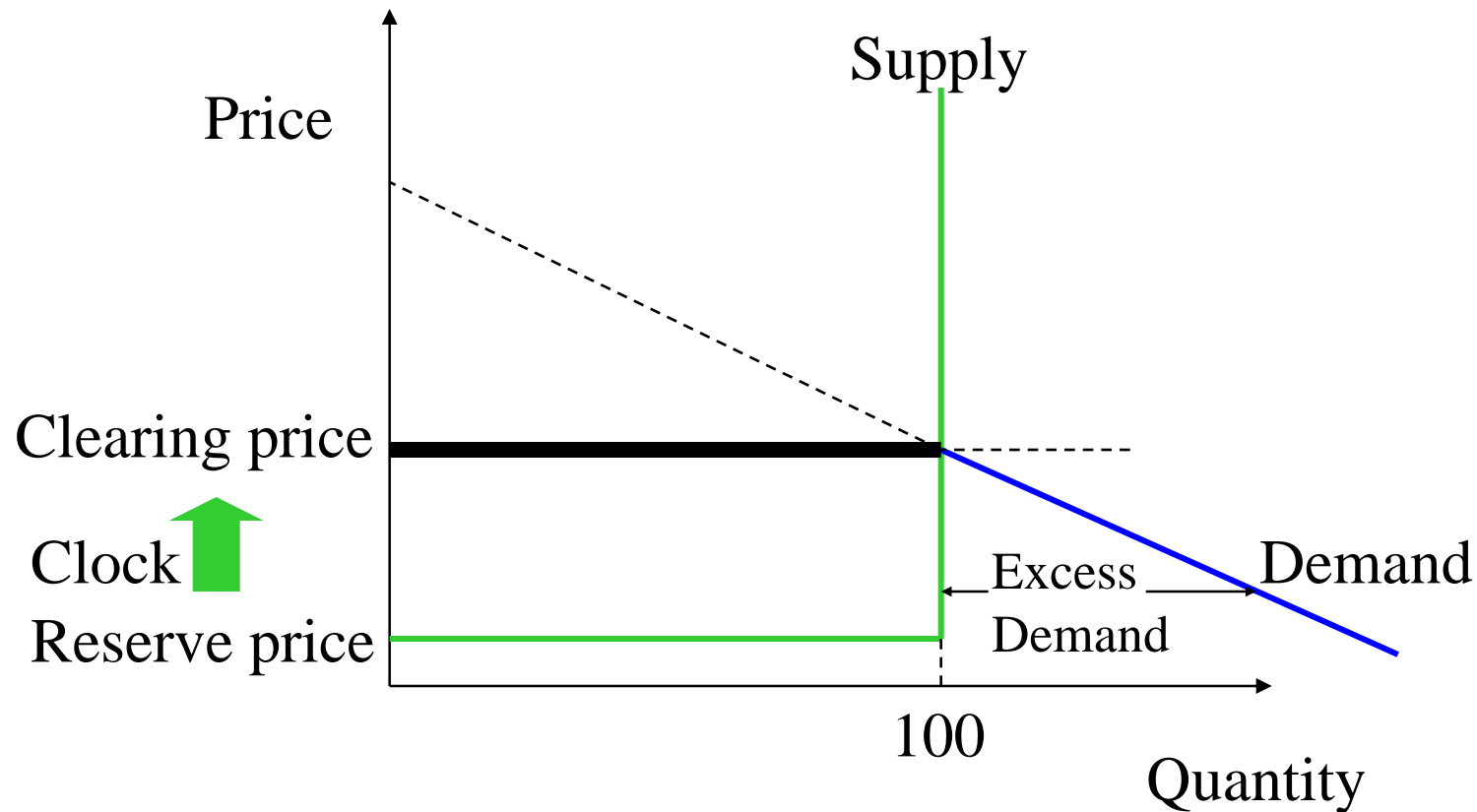
# Simultaneous ascending clock auction

- 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

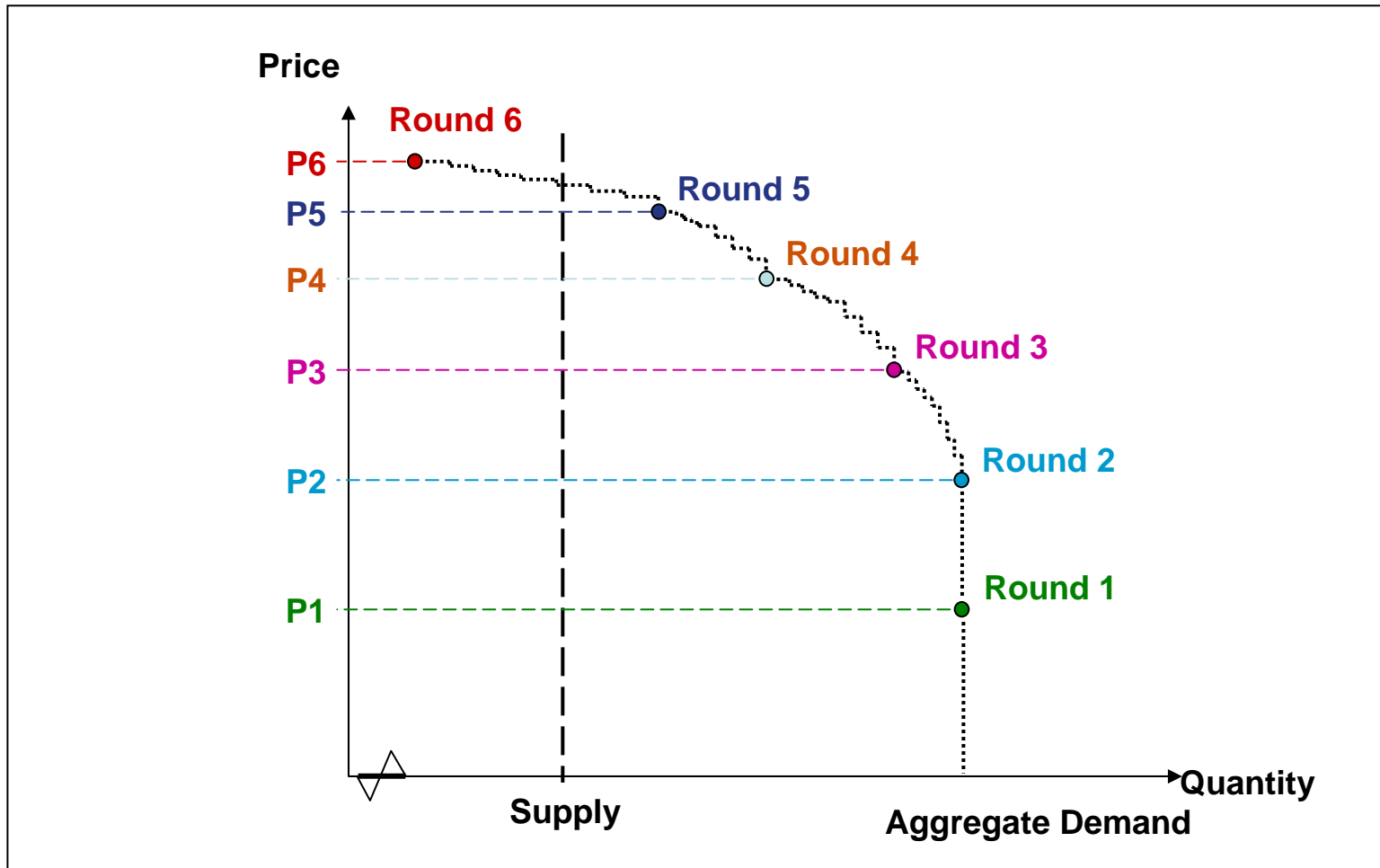
*Auction determines market price for each product.*

# 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

Excess demand

No excess demand

Round	Supply	1-year	2-year	3-year	4-year	5-year	Total
	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	350	400	2300
10	Price	\$7.60	\$7.80	\$7.85	\$7.90	\$7.90	
	Demand	600	500	400	400	400	2300

# 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