

Allowances for Sale: Virginia's NO_x Allowance Auction

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The Virginia NO_x allocation rule

- # 5% set aside for first five years, 2% thereafter
 - # Initial allocation period is 5 years
 - # Repeated allocations of 5-year blocks, 3 years in advance
 - # Based on the highest 2 years of heat input in previous 5 years
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The revenue surprise of 2002

- # Mark Warner inaugurated on Jan. 2002
 - # Revenues fall short, budget is in chaos
 - # Economist in budget dept. suggests auctioning Va's NOx allowances
 - # Five year allocation: 20,172 allowances
 - # Estimated income > \$150 million (very conservative est.)
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Decision made NOT to auction

- # Supported by Secretary of Finance
 - # Opposed by Secretaries of:
 - Natural Resources
 - Commerce and Trade
 - # Uncertainty over EPA response leads Governor to decide against auction
 - Perceived risk to transportation referendum
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Unexpected budget bill language

- # 2002 budget for FY04 includes \$8.8 million in 2004 **auction** revenue
 - Inserted by a legislative budget committee staffer
 - Specifies auction of 5% (set aside) allowances
 - Way over-forecasts allowance prices
 - # This survives 2003 legislative session
 - # 2004 General Assembly:
 - **Increases** revenue amount to \$12 M (?)
 - Forbids future allowance auctions (redundant, as none were authorized)
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Criteria for successful auction

- # Maximize revenues for the Commonwealth
 - # Earn at least \$8.8 million
 - Key rule: Don't disappoint legislature!
 - Required auction of 2 vintages: '04 and '05
 - # Auction must be completed by June 30
 - # Fair, understandable, and transparent auction process
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Why auction?

- # Allowance prices follow a Markov process
 - Today's price is the best predictor of tomorrow's price (for a given vintage)
 - If this were not so, then profits are being left on the table
 - # No bureaucrat can 2nd guess the market
 - # Auctions are fair and transparent
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Liquidity concerns

- # Daily liquidity in NOx OTC market:
 - 50 to 150 tons traded per day
 - # Virginia would sell 3,600+
 - # Brokers at major firms warned that such a large offering would depress the market price (Wrong!)
 - # How to make a bureaucrat sweat!!
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Auction planning gets in gear

- # The details of auction design are critical to auction success.
 - We know this from the telecom auctions
 - Lots of economic theory on auctions
 - # Interdisciplinary Center for Economic Science at GMU did design analysis
 - Theoretical analysis
 - Laboratory experiments
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Results of design work

- # Chose 3 auction designs for experimental investigation:
 - Simple sealed-bid
 - Three stage sealed-bid
 - English clock auction
- # English clock auction outperformed others by 17% in the laboratory

The “English clock”

- # Seller has many units to sell
 - # Seller announces price, bidders announce quantity
 - # Start at low price where demand is high
 - # Increase price at set time intervals
 - # Stop when demand equals supply
 - # Sell all allowances at ending price
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The winning brokerage bid

- # No mention of clock auctions in the RFP
 - # Credible bids from five firms
 - # All could do a sealed bid
 - # **Amerex Energy** proposed an English clock auction
 - This was a surprise as the ICES work had not been publicized
 - # Virginia chose the risky path to maximize revenue from the auction
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Preliminaries

- # 5 days of intense discussion on design detail: brokers, bureaucrats, academics
 - Sequential versus joint auction of vintages
 - Single price or discriminatory pricing
 - How to select winning bids
 - # Auction design finalized on June 14
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Programming and paperwork

- # Programming the internet application
 - # Writing contract
 - # Contacting potential buyers
 - # Getting contracts approved
 - # Arranging financial assurance
 - Bond ratings, escrow, or letters of credit
 - Bids limited to credit amounts
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Auction timeline

- # As of mid-April, time pressure appeared to rule out all but the simple sealed bid.
 - # RFP for auction brokerage services published May 17
 - # Responses were due on May 27
 - # Contract was signed on June 8
 - # Auction was held on June 24
 - Light-speed for a state bureaucracy!!
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The auction - bidders

- # Bidders see only two things
 - The current price
 - That the auction is still open
 - # Bidders enter only quantity bid
 - # Bidding early is important because winning bids are filled in order received
 - # Must bid each round to stay in
 - Can't increase quantity in later rounds
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The auction - seller

- # Announce schedule of rounds
 - Time for bidding
 - Time for posting new round
 - # Broker stays in touch with bidders
 - # When quantity bid falls below quantity to sell, auction ends
 - # Seller chooses top price or next price down to maximize revenues
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Price paid

- # Bidders at top price get goods at seller's chosen price
 - Even if next to last price is chosen
- # If final price drops down, additional quantity is sold in time order of bids
 - Bidders who drop quantity in last round may get some units at their last bid price

Auction results: 2004 vintage

- # Number for sale: 1,855
 - # 19 bidders, 10 winners
 - # Day before the auction:
 - Bid: \$2,200; Ask: \$2,350
 - # Morning of auction over-the-counter sale: \$2,250 per ton
 - # Auction clearing price: \$2,325
 - # **3.3% over morning trade price!**
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Auction results: 2005 vintage

- # Number for sale: 1,855
 - # 17 bidders, 5 winners
 - # Day before auction:
 - Bid: \$3,150; Ask: \$3,200
 - # Morning of auction over-the-counter sales: \$3,200 per ton
 - # Auction clearing price: \$3,425
 - # **7% over the morning trade price!**
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Revenue exceeds expectations

- # Total auction revenue: \$10,666,250
 - # Auction expenses: under \$200,000
 - Including one-time research costs
 - # Net revenue: \$10,466,250
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Conclusions

- # Market liquidity not a factor
- # Financial guarantee requirements were greatest barrier to participation
 - But are essential for auction success
- # Participants understood auction
 - Simplicity of auction design is important
- # Internet provides perfect auction “room”
- # **Auction revealed market value of NOx allowances**