Scarcity Pricing: Interactions with Demand Response and Virtual Bidding

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Outline

- **Goal of scarcity pricing mechanism**
  - What are we trying to achieve?
- **Interaction with demand response**
  - Potential conflicts with existing demand response programs
- **Interaction with convergence bidding**
  - Can scarcity pricing and convergence bidding co-exist?
- **Desirable characteristics of scarcity pricing mechanism under MRTU**

Goal of Scarcity Pricing Mechanism

- **When there is true scarcity of energy or ancillary services, price of relevant product should rise to a level that reflects this scarcity**

- **Must be careful to distinguish true from artificial scarcity**

- **Little rationale for price of energy to rise to scarcity levels if energy is not scarce**
  - Similar logic applies to the case of ancillary services

- **Scarcity prices can arise in both day-ahead and real-time markets**

- **Scarcity pricing mechanism should only operate when market mechanisms fail**
  - Demand is greater than or equal to supply at offer cap on energy or ancillary services market

Scarcity Pricing versus Administrative Scarcity Pricing Mechanism

- **Scarcity Pricing--Downward-sloping demand curve allocates a fixed supply**

- **Administrative Scarcity Pricing Mechanism--Administrative process for setting price when supply is less than demand offer cap**
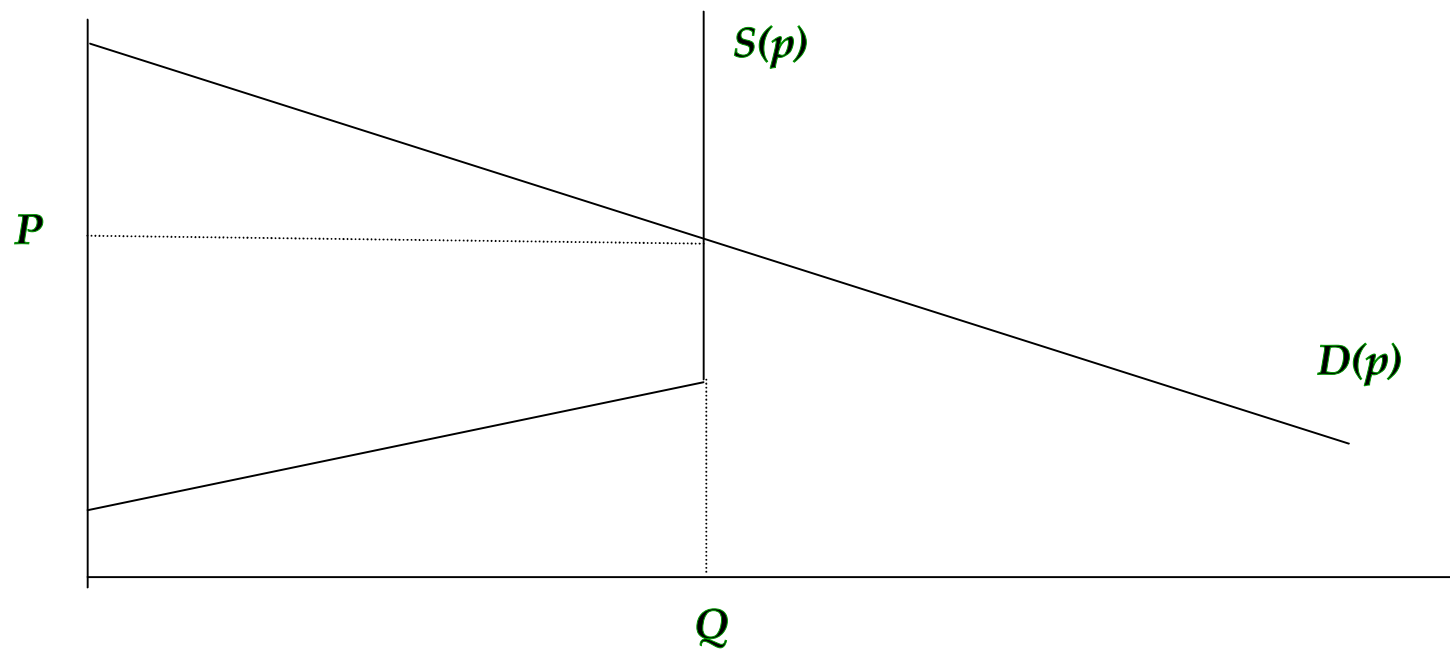
Distinguishing True from Artificial Scarcity

- **Cost of an administrative procedure based on system conditions to set "scarcity prices"**
  - Suppliers take actions to cause these system conditions to occur
  - Regulator-sanctioned form of exercising unilateral market power

- **Properly designed scarcity pricing mechanism should limit opportunities for suppliers to exercise unilateral market power in short-term market**
  - Use actual demand-side of market to set scarcity prices not an administrative procedure that can be manipulated by suppliers

Scarcity Pricing and Demand Response

- **Active demand side participation in wholesale market is desired form of scarcity pricing**
  - With enough demand that actively participates in the day-ahead and real-time markets there is no need for an administrative scarcity pricing mechanism
- **Currently three types of demand response in California ISO markets**
  - Participating load—Can bid downward sloping curve into day-ahead and real-time market and offer into ancillary services markets
  - Non-Participating load—Can bid into day-ahead energy market but not ancillary services market
  - Emergency Triggered DR—Interruptible load, but currently can only be curtail if ISO declares a Stage 2 Emergency.
    - Cannot currently offer into ancillary services market.

Scarcity Pricing and Demand Response

- **Participating load bidding into day-ahead ancillary services market can eliminate need to declare scarcity conditions in day-ahead ancillary services market**
  - Demand at ancillary services offer cap always less than or equal to supply at offer cap
- **The other two forms of demand-side participation cannot prevent scarcity of ancillary services**
  - They cannot offer into ancillary services market
  - ISO purchases day-ahead ancillary services based on its demand forecast
- **Scarcity of ancillary services in day-ahead market should not result in administratively set scarcity prices for energy in day-ahead market**
  - Non-participating load can submit price-responsive energy bids in day-ahead market so that supply exceeds demand at offer cap
    - No administrative scarcity pricing necessary to clear energy market

Scarcity Pricing and Demand Response

- **Emergency Trigged Demand Response does not fit into existing energy scarcity pricing paradigm**
  - Real-time demand reduction brought about by calling on interruptible loads reduces level of demand necessary to clear real-time energy market
    - Stage 2 declared because of scarcity of operating reserves in real-time
    - Interruptible load reductions reduces real-time energy demand
    - Lower real-time demand reduces real-time prices
- **Best solution is to require all demand response to submit price-responsive bids into real-time energy market**
  - High real-time prices, not declaration of Stage 2 by ISO, should cause real-time demand reductions
  - Retailer with interruptible load should decide when to use it based on real-time price signal
    - Allows market test of value of interruptible programs
    - Real-time energy cost savings > Payments to interruptible loads
- **CPUC should require interruptible load programs to show cost effectiveness**

Scarcity Pricing and Demand Response

- **Difficult to argue there are scarcity conditions in energy or operating reserves if after interruptible loads are called both operating reserves and energy requirements are met**
- **Tying the use of interruptible loads to the declaration of a Stage 2 emergency by ISO could create incentive for operators to declare Stage 2 emergency when they expect tight real-time system conditions**
- **Real-time energy prices should be high when real-time demand versus supply conditions are tight**
  - Provides signal to retailers to use interruptible loads
  - Provides suppliers with strong incentive to stay on line and produce
    - Incentive to produce maximum output of unit given high real-time price
- **Existing mechanism of tying demand interruption to declaration of Stage 2 emergency limits incentives for suppliers to produce as much as possible**
  - Low real-time prices possible because of interruption

Scarcity Pricing and Convergence Bidding

- **Convergence bidding help to address problems with existing interruptible loads**
  - Convergence bidders can submit demand bids in day-ahead market in anticipation of interruptible demand reductions in real-time because of declaration of Stage 2 emergency
  - Can raise day-ahead energy prices because of higher day-ahead demand
    - More physical generation units selling energy in day-ahead market
  - Day-ahead ancillary services prices may rise because less units available to provide ancillary services
- **Reliability consequences of convergence bidding in this context are positive**
  - More units committed to supply energy
    - ISO less likely to need to declare Stage 1 or Stage 2 emergency
  - Ancillary services requirements are met or scarcity pricing of ancillary services triggered

Scarcity Pricing and Convergence Bidding

- **Convergence bidding alone cannot create scarcity conditions in energy or ancillary services**
  - Convergence bidding implies no net production or consumption of electricity,
    - Sale in day-ahead implies purchase in real-time
    - Purchase in day-ahead implies sale in real-time
- **Convergence bidding can raise and lower day-ahead and real-time energy and ancillary services prices**
- **The goal of convergence bidding is make day-ahead prices as reflective as possible of real-time system conditions**
  - Day-ahead price equals expected value of real-time prices as of close of day-ahead market
  - Real-time prices cannot be predicted better than day-ahead price given all information available at close of day-ahead market
- **Convergence bidding should make scarcity pricing of energy or ancillary services less frequent**

Scarcity Pricing Under MRTU

- **Do not allow scarcity pricing mechanism to interfere with operation of demand response, convergence bidding, and other market mechanisms**
  - As long as supply is greater than demand at offer cap at any horizon to delivery, there is no need to invoke scarcity pricing mechanism
- **Scarcity pricing should only be invoked when market fails to procure sufficient energy or ancillary services at relevant time horizon to delivery (day-ahead or real-time)**
- **CPUC should work to eliminate interruptible load tied to declaration of Stage 2 emergency by ISO**
  - Reliability of ISO network should be enhanced if retailer is required to determine when interruptions take place
    - High real-time prices will coincide with tight real-time system conditions

Scarcity Pricing Under MRTU

- **The CPUC and ISO should mandate that all load-serving entities submit non-spinning reserve ancillary services load bids at or below bid cap equal to at least 10 percent of day-ahead energy schedule**
  - Bids for real-time energy associated with ancillary bids must be at or below bid cap on real-time energy market
- **This builds in feasible amount of demand response into both ancillary services and real-time energy market**
  - Eliminates need to rely on administrative mechanism to set scarcity prices
  - Demand bids will set high energy prices and load will be curtailed in real-time market based on willingness to curtail of loads
  - Minimizes use of administrative scarcity pricing mechanism
    - Willingness to pay of final consumers determines price at which available supply equals amount demanded at that price in virtually all circumstances

Questions/Comments?