A Market Mechanism for Long-Term Energy Contracts

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Agenda

1. Long-term market design objectives
2. Product definition
3. Selecting winning bids
4. Implementation challenges and open questions
Long-term market design objectives

- Simplicity and standardization
- Reflect differential value of different resources
- Efficient short-run operations/markets
- Allocate risk appropriately
- Complementary with heterogeneous policy
- Limit opportunities for gaming or market power
Key pillars: short-term markets and policy

**Short-term markets**

- Basis of valuation and settlement
- Valuing scarcity, full economic costs (including opportunity costs) of meeting load
- Enabling demand-side participation
- Incentivize, but not guarantee, resource adequacy (additional “insurance” products may be needed / desired in some cases)

**Climate and clean energy policy**

- Electricity markets don’t value decarbonization without a policy driver
- Varying policy structures across jurisdictions - carbon pricing, clean energy standards, renewable energy standards, tax incentives, etc.
- States have distinct resource and policy design preferences for a reason - optimal decarbonized mix may not be in the interest of all states or regions or politically feasible
- Long-term markets need to be compatible with a wide range of climate/clean energy policies
Product definition: basics

- Long-term contract for differences for a specified production profile (shape)
- Seller gets fixed price per MWh for contracted profile, net of real-time electricity price applied to the contracted shape
- Buyers bear price risk, but seller bears production risk relative to contracted profile
Product definition: example

Solar PV project in Texas bids a fixed price and specifies a production shape based on their average hourly-by-monthly profile and clears the market
Product definition: example

- Actual production varies from day to day, year to year.
- Project is paid fixed price per MWh for the contracted shape, not actual production.
- Actual production sold into real-time market, and project earns actual MWh times real-time price
- Contract for differences settles by netting back to buyer contracted profile times real-time price
Selecting winning bids: option 1

- LSEs submit how many MWh they seek to purchase, total demand is aggregated
- Bids evaluated against agreed upon forward price projection (with hourly price profiles)
- Bids ranked from highest to lowest net value (gross value per MWh - fixed bid price per MWh)
- Winning bids are pooled, and allocated proportionally to LSEs
Selecting winning bids: option 2

Sellers submit:
1) fixed bid price
2) contract MWh production shape

Buyers submit:
1) hourly willingness to pay
2) hourly MWh demand profile

Clearing Mechanism
Optimizes selection of bids to maximize total value (hourly production shape times hourly willingness to pay), net of fixed price contract costs

Outputs:
• Cleared contracts that contribute to the highest-value mix
• Proportion of MWh from each contract to allocate to each buyer
  • Time profile of contracted supply for each buyer
Selecting winning bids: option 2 example

Sellers submit fixed price bids and production shapes

Clearing mechanism selects bids and allocates portions of contracts to maximize aggregate net value

LSEs / buyers submit demand profile and willingness to pay

Solar MWh

Wind MWh

Geothermal / Nuclear MWh

Load MWh

WTP $/MWh
Regular iterations for incremental needs

Buyers purchase contracts over time to avoid too much exposure to prices from any single year.

As old contracts roll off, they can be replaced with new contracts for the highest net value resources.
Risk allocation

**Risks borne by seller**
- Performance risk (vs. contracted profile)
- Pooled buyers’ credit risk
- Basis risk (if contract settles at zone or hub but project earns nodal price)

**Risks borne by buyer**
- Value of contracted shape relative to short-term market (including curtailment during low-price hours)
- Demand profile and demand forecasting risk
- Pooled sellers’ credit risk

**Risks borne by both**
- Value forecasting risk (projecting future value, awarding contracts on the basis of projected value)
- Policy, short-term market design changes
Implementation considerations

Who operates the market:

- Many options: government agency, market operator / RTO, third-party exchange, green bank

Mandatory or voluntary market:

- Voluntary for sellers
- Voluntary for buyers (but could be used to meet an LSE hedging/contracting requirement)

Eligible resources:

- As a financial contract, this mechanism could be open to any resource, portfolio/aggregation of resources, as long as participants could meet credit requirements
- A mechanism like this could be constrained to carbon-free resources and used as a procurement mechanism for a clean energy standard
Implementation considerations

Interactions with clean energy and climate policy:

- Suppliers bids would reflect exogenous policy incentives
- Carbon price could influence short-term energy prices, and therefore price expectations/valuation
- Approach could be constrained to carbon-free resources to use as a procurement mechanism for clean energy standard

Creditworthiness of buyers:

- Lack of creditworthy buyers or sellers could raise risks for projects and/or other buyers of a pooled set of contracts

Variants:

- Not just shaped energy, but other contract structures better suited to dispatchable/flexible resources (tolling agreements, cap options, storage / energy shifting contracts)
Thank You!

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