Is It Possible to Charge Market-Based Pricing for Ancillary Services in a Non-ISO Market?

Regulation and Operating Reserves

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Rapid penetration of renewable resources increases demand for ancillary services (AS)

- EIA forecasts that renewables will account for 28% of growth in new capacity from 2012 to 2040

AS are services necessary to support transmission of power from resources to loads while maintaining reliable operation of a transmission system within and among BAAs.
GROWING NEEDS FOR RAMPING CAPABILITY

- Variable output of renewables could cause large swings in a system’s Area Control Error (ACE) and frequency bias on a minute-to-minute basis
- System operator increases the flexible ramping requirement
  - NYISO expects the ramping demand for its system to rise by 60% by 2018\(^1\)
- New type of ramping service may be needed

Examples of One-Minute Area Control Errors

IS MARKET OUTSIDE ISOs READY FOR RISING ANCILLARY SERVICES DEMAND?

Illiquid market-based rate (MBR) trading for ancillary services (AS) outside ISO markets

- Low volumes and number of suppliers, according to EQR 2010-Q2 2013

- Most AS sales have been done under balancing authority areas’ (BAAs’) Open Access Transmission Tariff rates
DRIVERS HINDER DEVELOPMENT OF MBR TRADING OUTSIDE ISO MARKETS

A competitive market will be robust if products offered in sufficient volumes have reasonable *interchangeability* with respect to price, usage, and qualities

*Two main questions:*

- What are technical factors that would prevent competing suppliers to sell AS?
- What are economic factors that would prevent competing suppliers to sell AS?
KEY FINDINGS—NON-ISO MARKETS

Waiving market power tests for Spinning Reserve and Non-spinning Reserve (or Supplemental Reserve) may promote more bilateral MBR sales for these services, but suppliers may not overcome technical barriers in constrained markets.

For Regulation, FERC’s different AS pricing policies create a barrier to develop a competitive market outside ISOs/RTOs.

- The use of existing cost-of-service price cap as a damage control for Regulation could discourage bilateral trade and new entry.
## TECHNICAL BARRIERS

The higher the quality, the lower the substitutability of the AS product

### Contingency Condition
- **Spinning Reserve**
- **Non-Spinning Reserve**
- **Supplemental Reserve**

### Normal Operating Condition
- **Regulation**
- **Energy Imbalance**
- **Black Start/Voltage Support (Reactive Power)**

### Response Time (Minutes)
- High Quality
  - 1
  - 10
  - 30
  - 60+
- Low Quality

### Type of Ancillary
- **Regulation**
  - Response Rate: Respond Very Fast to Random Imbalances Based on AGC
  - Synchronous Resource: Yes
  - Local Requirement: Not Necessary
  - Flexible TX Scheduling: Dynamic Scheduling Firm Transmission
- **Spinning Reserve**
  - Response Rate: Respond Minute-to-Minute Changes When Regulation is Inadequate
  - Synchronous Resource: Yes
  - Local Requirement: Fixed % of local gen
  - Flexible TX Scheduling: Firm Transmission
- **Non-Spinning Reserve**
  - Response Rate: Respond to Changes that Persist for Several Minutes or More
  - Synchronous Resource: No
  - Local Requirement: Not Necessary
  - Flexible TX Scheduling: Firm Transmission
ECONOMIC BARRIER--FERC’S AS POLICIES

To promote more renewable integration and attract investment in new storage technologies FERC issued Order 755 (2011)

- FERC required ISOs/RTOs to provide additional compensation for Regulation resources based on their performance, known as Mileage payment.

To foster competition in AS markets FERC issued Order 784 (2013)

- FERC modified existing MBR regulations to allow suppliers who pass the energy and capacity market power test in a relevant balancing authority area (BAA) market to sell Spinning and Non-Spinning Reserves if:
  - Sellers can demonstrate that their transmission services can be intra-hourly scheduled
- No relief of market power test for Regulation sales.
- Suppliers can sell Regulation services outside ISOs/RTOs at MBR as long as the prices do not exceed BAAs’ Regulation tariff rates.
## REGULATION SERVICE IN ISO VS. NON-ISO

### Pricing Structure of Regulation Service

<table>
<thead>
<tr>
<th></th>
<th>ISO</th>
<th>Non-ISO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulation</strong></td>
<td>Yes, through ST auction Reflects Opportunity Cost</td>
<td>Need to pass MP test but can charge MBR if it is below tariff rate</td>
</tr>
</tbody>
</table>
| **MBR**        | Two-part pricing  
|                | - Capacity                                                          | One-part pricing  
|                | - Mileage (Performance)                                             |                                               |
| **Pricing Design** | NERC Reliability Standard (CPS)                                    | NERC Reliability Standard (CPS)                                                             |
| **Quantity Demand** | Price cap with built in scarcity pricing demand curve              | Price cap--buyer balancing authority area’s tariff rate                                      |
| **Mitigation** |                                                                      |                                               |
Rate differentials create trading opportunity but using these rates as “damage control” caps may discourage entry of alternative supplies.
ISO 2-part pricing structure would attract higher quality Regulation resources from non-ISO markets.
## NUMERICAL EXAMPLES - Performance Payment

### Example 1: High Quality Ramping Resource

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier A’s capacity</td>
<td>10 MW</td>
</tr>
<tr>
<td>Ramp Rate</td>
<td>10 MW/ 4 sec.</td>
</tr>
<tr>
<td>Total Mileage (per minute)</td>
<td>150 MW-Miles</td>
</tr>
<tr>
<td>Regulation Interval</td>
<td>15 min.</td>
</tr>
<tr>
<td>Total Mileage (per Regulation Interval)</td>
<td>2,250 MW-Miles</td>
</tr>
<tr>
<td>Regulation Price</td>
<td>$0.10 /MW-Mile</td>
</tr>
<tr>
<td>Supplier A’s Revenue</td>
<td>$225.00</td>
</tr>
</tbody>
</table>

### Example 2: Low Quality Ramping Resource

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier B’s capacity</td>
<td>150 MW</td>
</tr>
<tr>
<td>Ramp Rate</td>
<td>10 MW/ min</td>
</tr>
<tr>
<td>Regulation Interval</td>
<td>15 min.</td>
</tr>
<tr>
<td>Total Mileage (per Regulation Interval)</td>
<td>150 MW-Miles</td>
</tr>
<tr>
<td>Regulation Price</td>
<td>$0.10 /MW-Mile</td>
</tr>
<tr>
<td>Supplier A’s Revenue</td>
<td>$15.00</td>
</tr>
</tbody>
</table>


NEEDS FOR HIGH QUALITY RAMPING RESOURCE OUTSIDE ISOs

BAA with wind generation

BAA with no renewables
# SPINNING AND NON-SPINNING RESERVES

Pricing Structure of Operating Reserves (Spinning and Non-Spinning Reserves)  
ISO vs. Non-ISO

<table>
<thead>
<tr>
<th>Operating Reserves</th>
<th>ISO</th>
<th>Non-ISO</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBR</td>
<td>Yes (Opportunity Cost)</td>
<td>Yes No need for market power test if pass for energy/capacity</td>
</tr>
<tr>
<td>Pricing Design</td>
<td>Capacity, Energy if dispatched</td>
<td>Capacity, Energy if dispatched</td>
</tr>
<tr>
<td>Mitigation</td>
<td>Yes, but varies by ISO; built in scarcity pricing demand curve</td>
<td>Price cap--buyer balancing authority area’s tariff rate</td>
</tr>
<tr>
<td>Quantity Demand</td>
<td>NERC Sub-regional Reliability Standard</td>
<td>NERC Sub-regional Reliability Standard</td>
</tr>
</tbody>
</table>
Observations: 1) For many utilities, rates are the same for Regulation, Spinning, and Non-spinning (Supplemental) reserves; 2) Tariff rates of both reserves are high enough to support the development of their competitive markets.
RECOMMENDATION (1)

- Allow qualified external resources to provide Regulation, Spinning and Non-Spinning Reserves
  - Ability to change transmission schedules within intra-hour is not enough
  - Suppliers must have firm transmission
  - For Regulation, they need to have both dynamic scheduling and firm transmission
- Markets with non-firm transmission capacity but no available firm transmission will rely on internal resources, thus price caps based on existing tariff rates are likely to induce the right behavior
RECOMMENDATION (2)

- Mitigate economic barrier for Regulation
  - Revisit ancillary services rate design, particularly for Regulation Service
    - Rates could continue be based on cost-of-service
    - But create more transparency to gain economic efficiency
    - Reward resources based on the value of their services,
      - Two-part pricing design that reflects quality or performance of services but is still subject to revenue requirement
    - Right rate design induces right investment, particularly when a system needs to respond to rapid growth of renewable resources
Dr. Romkaew Broehm is an economist whose practice is focused on the electric utility industry. She specializes in the areas of competition and market oversight, market power analyses, studies of bulk power markets, evaluation of demand-side management, and utility cost structures.

She has submitted testimony and comments before the Federal Energy Regulatory Commission (FERC) on market-based rates (MBR), market manipulation, and merger and acquisition (M&A) matters. She has analyzed potential competitive impacts of M&A transactions on wholesale power markets for both horizontal and vertical market power aspects in various power markets, such as ISO-NE, NYISO, PJM, SERC, FRCC, SPP, Entergy System, and WECC.

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