Broader Regional Markets

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Electric Utility Restructuring

- **Goals**
  - Reduce overall cost of energy and operate efficiently
  - Facilitate competition and trade of electricity between market participants
  - Maintain security of supply
  - Foster generation and demand resources
  - Maintain system reliability

- **Evolution**
  - Market designs are different and changing
  - Physical systems present similar challenges independent of their market designs
  - Restructuring initiatives began with bilateral trading and “transmission access”
North America Trend

1. Balanced Schedule Coordination
   - Congestion problems
   - e.g., old CAISO and old ERCOT

2. “Standard Market Design”
   - State-wide /Regional market efficiency & system security
   - e.g., NYISO, PJM, ERCOT nodal

3. “Broader Regional Markets”/ “Stitched-up Seam”
   - Inter-regional coordination

4. “Broadened Regional Markets”/ “Seam-less”
   - Comprehensive joint coordination
European Trend

1. Balanced Schedule Coordination
   - SO and PX(s)
   - Balancing mechanism

2. Regional Markets/Net Pool
   - Multiple SOs and PXs
   - Cross border exchanges
   - Capacity allocation, etc.
   - ENTSO-based processes & protocols

3. “Broader Regional Markets”
   - Market integration
   - PXs - Market Coupling
   - Trades vs. Flows

   - “cross border”

5. Broader “IEM”
North America vs. Europe

- **North America**
  - ISO/RTO system centric: market efficiency and system security
  - Zonal to nodal
  - Seam issues

- **Europe**
  - TSO centric: cross border exchange
  - National to zonal to smaller zonal
  - “Congestion”
Drivers

- Market efficiency
- Market seams
- Congestion
- Loop flows
- Optimal utilization of transmission resources
- Intermittency and unpredictability
  - Gen and load
  - Inflexible resources
EU Target Model

- Coordinated available transmission capacity (ATC)
- Flow based approach (FB)

Capacity calculation:
- Physical and/or Financial Transmission Rights
- Implicit allocation
- Price coupling
- Continuous Implicit allocation
- Balancing

Time frame:
- Long-term
- Day-ahead
- Intraday
- Real Time

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Broader Regional Markets in NA/ Examples

- **Collaboration**
  - NYISO, PJM, MISO, IESO, HQ and ISO-NE

- **Market-to-Market Coordination**
  - Inter-control area “market-based” dispatch to manage congestion
  - Real-time market flows and firm flow entitlements

- **Interregional Transaction Coordination**
  - (HQ-NYISO) 15-min frequency based upon NY economic evaluation of flexible bids
  - (PJM-NYISO) adjust interchange on a 15-min frequency based upon NY economic evaluation of flexible bids
  - Coordinated Transaction Scheduling (CTS)
    - (ISO-NE-NYISO) 15-min frequency based upon a jointly coordinated economic evaluation
    - (PJM-NYISO) 15-min frequency based upon a jointly coordinated economic evaluation
  - Adjust HQ energy interchange over specific ties on a 5-minute frequency based upon NY economic evaluation of flexible bids
  - Expanding the Interregional Transaction Coordination Concept to include scheduling operating reserves and/or regulation service (study)
A Solution Provider Perspective

- Larger “footprint” – internal and external
  - Individual systems
  - Coordinated solutions
- Higher scheduling frequency and closer to the gate
- Larger and more complex optimization problems
  - Real-time security constrained unit commitment and dispatch
    - Look-ahead capability
- Maintaining system stability and security while pushing the grid to the edge
- Maintainability as well as flexibility to change and expand
- Infrastructure
- Standards
- Cyber security
Thank You