Extraordinary Reserves Proposal

July 7, 2014

by Louis Slade (Dominion) and Scarp (Direct Energy)

Proposal Components

- Extraordinary Reserve Product
- Joint Optimization
- Demand Resources Reserve Treatment
- Extraordinary Interchange Forward Product
- Parameter Limited Schedules

Extraordinary Reserve Requirement

- Whenever PJM commits additional resources to provide reserve in a quantity that exceeds the norms cited in manual 13, the total quantity shall set the ER requirement
- Additional Trigger: Hot Weather Alert, Cold Weather Alert, Max Gen Alert
- The ER Requirement is not established; rather, units are committed as needed and the ER requirement reflects that commitment
  - Hourly quantity is determined by PJM commitment to GO.
  - The new PJM Long-Lead Commitment tool is used to help set ER Requirement

DAY Ahead ER Requirement

- If triggering Alert is issued prior to the Day Ahead market deadline, the DA Extraordinary Reserve requirement will be procured along with the Day Ahead Scheduling Reserve requirement
  - If no major change occurs during RAC period, the DA ER requirement becomes the hourly RT ER requirement
  - The quantity may vary hourly to match the dispatch instructions given to the ‘additional’ units that were dispatched

Operating Day (RT) ER Requirement

- The DAER is matched to reflect what is expected in RT.
- During the operating day, the Extraordinary Reserve requirement will be procured along with the Primary and Synchronized Reserve (10 min) requirement
  - The hourly RT ER requirement will be based on DAER if additional units were given dispatch notice prior to, or as part of DA market clearing
    - Hourly ER quantity 'locked down' prior to Operating Day
  - The hourly RT ER requirement will be altered based on dispatch notice if additional units are dispatched during RAC or Operating Day

DA Adjustments

- Anything committed above current reserves requirement is used to determine the amount of ER needed for an operating hour
  - If long-lead time resource changes to economic energy in DA, extraordinary reserve could be reduced at PJM discretion

OD Adjustments

- Starting point; hourly ER quantity 'locked down' prior to Operating Day
- May be reduced if unit fails to provide energy when called or is converted to energy (exclude valley on double peak days)
  - If in a valley of winter day, PJM should not reduce ER due to the unit parameters if it will be needed again shortly
- The hourly RT ER requirement may be reduced, at PJM's discretion:
  - If one of the 'additional units' becomes unavailable (trips, fails to start, etc.) and conditions allow
  - If one of the 'additional units' is economic for any given hour, the reserve quantity may be relaxed for that hour
- The hourly RT ER requirement associated with a unit may be NOT be reduced:
  - As long as the 'additional unit' remains dispatchable by PJM and is within one or more of its PLS parameters

PJM Postings

- Hourly ER quantity – once PJM commits, regardless of number of days in advance, public posting on web
  - Posting includes each hour beginning 7 days prior and including OD
  - Quantities update as PJM makes commitments to resources
- Transparency assists market participants in making supply arrangements and intelligent market decisions
- Posting ER quantity along with Primary Reserve and Sync Reserve quantity helps tell market how close market is to Primary or Sync Reserve shortage pricing
- Transparency helps ensure that Operators do not operate overly conservatively

Products to Meet RTER Requirement

- Tier 1 sync, Tier 2 sync, 10 minute non-sync, 11-30 minute non-sync
- Once set as a non-sync product, the resource remains that non-sync product until converted to energy.
  - In other words the 30 minute non-sync does **not** change to 10 minute non-sync 21 minutes after being called on -- for payment purposes. It would count when calculating quantity of primary reserve.

Clearing

- Each given product has a single clearing price regardless of reserve category (primary, sync , ER)
- Eligible when synch or if start time parameter is within non-sync target
- Ramp rate is used to determine eligible quantity
- Leverage existing PJM joint optimization process
  - 5 minute clearing, but based on a largely hourly target
- Nesting per PJM proposal.
  - Maintain Primary Reserves and utilize Extraordinary Reserves first
  - The goal is to prevent a primary reserve shortage or synchronized reserve shortage through appropriate utilization of ER bucket

Shortage

- No shortage penalty factor for ER
- Penalty Factor is **not** needed because primary reserve already looks ahead (45 minutes)
- Extraordinary Reserves are being utilized for extra commitment designed to maintain Primary and Synchronized Reserve requirements.
  - Extraordinary Reserves are not meant to deal with largest ‘already running’ contingency on system

Cost Allocation

- The costs associated with Extraordinary Reserve should be allocated to deviations as we believe these are aligned with the causations cited by PJM
  - Over 30,000 MW of generation was on forced outage on a single winter day in 2014, primarily due to inability to start
  - Max Load forecast error (only when under forecast) of approximately 3,000 MW
  - Max interchange volatility of approximately 8,000 MW
- More cost-allocation detail is given under Extraordinary Interchange section of proposal

Demand Response Counting Toward Extraordinary Reserves

- The recent introduction of the 30 minute lead-time DR has added operational flexibility in accurately meeting energy and reserve needs
- The 30 minute DR shall be included in Extraordinary Reserves quantity calculation
  - Pre-emergency DR and Economic DR counts
- 30 Minute DR can be paid Extraordinary Reserves by making a voluntary offer

Extraordinary Interchange

- New 2 hour Product for interchange
- This product would include some form of price (payment) guarantee and would be exempt from BOR and ER charges
- Target Quantity based on 2 hour forward estimate
  a) quantity of forward resources that would otherwise be committed (such as DR, CTs, etc.)
  b) interchange already scheduled for timeframe
  c) load forecast for timeframe
- c – a – b = Interchange Target Quantity

Positives of Extraordinary Interchange Product

- Increased price certainty for market participants
- Reduced interchange volatility
- Could leverage ‘forward pricing’ engine being currently evaluated for use in CTS (PJM-NYISO) and being discussed as part of PJM-MISO (JCM) interchange optimization

Clearing Engine

- PJM would solicit, by posting desired hourly net-schedule quantity, 'non-recallable' imports (Interchange)
- Can be based on non-firm or firm transmission service
- PJM would then perform 'forward looking' LMPs for those hours and would clear import interchange (up to quantity posted) whose offer was less than or equal to their 'forward looking' LMP estimates
- Imports that flow for the entire duration (as cleared by PJM) would receive their offer price and be exempt from BOR and Extraordinary Reserve charges
- Imports that were cleared but did not flow in hourly quantity cleared would receive the lesser of; their offer price or RT LMP (at the import pricing point) for hours where the quantity is less than cleared and would be subject to BOR and Extraordinary Reserve charges for deviation that occurs during each such hour

Approval of Real-Time Interchange

- The ‘Normal’ RT Interchange product is the existing product. It is different than the new 2 Hour Interchange Product (Extraordinary Interchange Product)
- The following rules only apply on extra-ordinary reserve days where a Max Gen Emergency Alert has been issued and there is a non-zero extraordinary reserve requirement
- All Interchange procured by PJM in the 2-hour Interchange product (Extraordinary Interchange) will be scheduled to flow
  - Subject to existing NERC and reliability curtailment procedures
- PJM not required to accept changes to Normal RT interchange requests during the posted hours

RT Interchange Cost Allocation

- Applies only on extra-ordinary reserve days where a Max Gen Emergency Alert has been issued and there is a non-zero extraordinary reserve requirement
- 'Normal' RT Interchange will count toward deviations used in cost allocation of Extraordinary Reserves.
  - Fits with charging the major forces creating need for the ER product
- 'Normal' RT Interchange will count toward deviations used in cost allocation of BOR
- As noted before, Extraordinary Interchange would be exempt from BOR and ER charges if flow as scheduled

Parameter Limited Schedules

- Generation parameters limits are based on a unit's characteristics that "limit" it from operating in a completely flexible manner.
  - These inflexibilities are a major contributor to uplift.
- On Extraordinary Reserve days, generation shall be dispatched on “Price Based Parameter Limited Schedules”
  - Parameter Limited Schedule used regardless of whether unit passes the 3-pivotal supplier test
  - Offers Prices remain not cost-capped, subject to 3-pivotal supplier test

Questions?