Manual Curtailment of Wind Generation in PJM

IRTF
June, 2013
Background

- **Docket #ER10-1762-000 / ER11-87-000 and ER11-87-001:**
  - Section 36.1.1 and Attachment K Section 1.7.4 (i)
  - Economic Minimum that is no greater that the higher of physical operating minimum or its Capacity Interconnection Rights

- **Generator Operational Requirements M14D R19 (10/1/10)**
  - Incorporated Wind Farm Communication Model as Attachment L.

- **Balancing Operations M12 R21 (10/1/10)**
  - Attachment B: Transmission Constraint Control Guidelines: Replaced existing note box in section B.2 Generation Redispatch to reflect revision to PJM tariff regarding energy resource curtailments (Docket #ER10-1762-000).

- **Definitions and Acronyms M35 R18 (10/1/10)**
  - Added Capacity Interconnection Rights and Maximum Facility Output definitions and modified Dispatchable Generation definition to reflect revision to PJM tariff regarding Energy Resource Curtailments (Docket #ER10-1762-000).
The three requirements for a unit to be dispatchable are:
Communications

• Unit must send active
  – MW
  – Wind Speed
  – Wind Direction via SCADA/ICCP
  – Cannot be static or flat-lined for an extended period of time
  – Within reasonable limits
Communications

- Unit must electronically receive control signals
  - Economic Basepoint
  - Curtailment Flag
  - Generator On Reason (GENRUNR)
- All eDart generator outage tickets must be up to date
Controls

• Unit must be capable of honoring electronic control signals as received
  • Physical controls in place to throttle their turbines / generation

• Control signals include
  • Economic Basepoint
  • Curtailment Flag
  • Generator On Reason (GENRUNR)
• Security Constrained Economic Dispatch
  • Inputs
    • Load
    • Interchange
    • Unit Parameters
      – Such as Eco Min, Eco Max, Ramp Rates, Cost Curves
      – Schedule
  • Constraints
    – Internal
    – M2M
    – Distribution Factors
• Output
  • Unit Economic Basepoints
    – $ per MW effect
• Manual Dispatch is not desirable
• Units should follow their Economic Basepoint.
  
  • SCED Logic for Wind
    • Economic Basepoint = economic max
    • Unless the unit is being curtailed
    • Curtailment flag set for Basepoint < Eco Max
  
  • The Economic Basepoint is ramp rate limited
    • What the unit can ramp in the next look-ahead interval
    • Look ahead is 15 minutes.
• If the Basepoint doesn’t make sense
  • Check Eco Min and Eco Max
  • Check Unit Availability status
    • economic, must run, not available
  • Check for manual overrides
    • fixed gen flag, unit output
  • Check data quality
    • wind forecast; other telemetry must be updating
• Units should update their Economic Minimum and Economic Maximum
  • At least once an hour; more often as the forecast changes
  • Eco Min should be less than or equal to unit output and CIR (Eco Min ≤ CIR and ≤ Output)
  • Eco Max should be greater than or equal to unit output (Eco Max ≥ Output)
• Not Dispatchable
  • Eco Min = Eco Max
  • Fixed Gen flag is set to yes
  • Basepoint will reflect back (or mirror) the units current output
• The telemetered Generation Run Reason code (GENRUNR), indicates PJM’s ‘logged-on’ status for the unit:
  • These values of GENRUNR mean your unit is dispatchable:
    • 2 or 17 indicate your unit is operating as Economic.
    • 22 indicates your unit is Company Dispatchable.
  • These values of GENRUNR indicate your unit is not dispatchable:
    • 16 indicates your unit is Released.
    • Other
    • Contact PJM Dispatch to have this corrected.
• Common Problems
  • Out perform Eco Max
  • Data Quality
  • Units do not follow Basepoint
  • Operators lack confidence in unit performance
  • Manual Dispatch compound issues
EcoMax = Orange
BasePoint = Red
EcoMin = Blue
Unit Output = Green
CurtailFlag = White
EcoMax = Orange
BasePoint = Red
EcoMin = Blue
Unit Output = Green
CurtailFlag = White
• 107 Dixon-169 Mcgirr Rd 10714 B 138 kV l/o 138L
  Waterman-11323-Haumesser
  • PJM internal thermal constraint
  • Periodically bound in SCED on 4/21-12:00 and 4/22 - 00:40
  • Manual Dispatch 4/21/13 @ 12:16 to 4/22/13 @ 10:48
  • Unit does not receive SCED Basepoint
• 6101 – Hennepin 138 kV l/o Oglesby Tap 138 kV
  
  • MISO M2M constraint
  
  • Periodically bound in SCED
    • Consistently ~12+ hours on 4/21
    • Consistently ~ 6+ hours on 4/22
    • Bound in 193 SCED Case
  
  • Manual Dispatch 4/21/13 @ 10:56 to 4/23/13 @ 00:34
  
  • Unit was not following SCED Basepoint
• 107 Dixon-169 Mcgirr Rd 10714 B 138 kV
  
  • PJM internal thermal constraint
  
  • Periodically bound in SCED on 4/29 17:55 to 19:40
  
  • Manual Dispatch 4/29/13 @ 17:35 to 5/01/13 @ 03:04
  
  • Unit does not receive SCED Basepoint
• 74 Kweanne L74B1Z3 Series Device I/o 6101 Streator-Hennepin

• PJM internal thermal constraint
• Periodically bound in SCED 4/29 -17:33 to 5/2 - 03:18
• Manual Dispatch 4/29/13 @ 16:07 to 5/02/13 @ 03:06
• Unit does not receive SCED Basepoint