

# Stability Limits in Markets and Operations

Lisa Morelli, Director - Market Design

Joe Ciabattoni, Manager - Interregional  
Market Operations

Markets and Reliability Committee

December 17, 2020

- Stability Limits – Under certain transmission outage conditions, the output of nearby generating station(s) may need to be curtailed to prevent transient instability events and prevent damage to generator due to the loss of synchronization.
- Issue charge was sponsored by a stakeholder and approved at August 7, 2019 MIC meeting.
  - Create an approach to provide consistent treatment of generator stability limitations and enhance market transparency of such conditions.

One of two approaches are currently used to address generator stability limitations:

1. Market Seller opts to reduce economic maximum output to the communicated stability limit
  - Concerns with generator outage reporting requirements
2. If Market Seller does not elect option 1, PJM creates thermal surrogate/interface to reflect stability limitation in LMPs
  - Use of LMP to reduce generators can produce inconsistent results

Packages were developed to create consistent treatment of generator stability limitations

	<b>% Votes In Favor</b>	<b>% Favored over Status Quo</b>
Generator Output Constraint Package (main motion)	64%	71%
Opportunity Cost Package	58%	72%

	Solution
Method for enforcing stability limitation	Use new Generator Output Constraint
Constraint reflected in LMP?	No
Outage Ticket Required? EFORd impact?	No
Transparency	Post data on the frequency, location and number of affected units (in adherence with confidentiality rules)
Lost Opportunity Cost paid for reduced output?	No

The Opportunity Cost alternate package is identical to the Generator Output Constraint package, with the exception that it would pay lost opportunity cost credits for any output reduced due to stability limitations

- Output of generator(s) are controlled within the generator stability limit (MW)
  - Security Constrained Economic Dispatch (SCED)
  - Day-ahead and Real Time
- Sum of generator(s) output (plus reserves) are economically dispatched within the stability limit
  - $\text{MW Limit} \geq \text{Generator 1 MW} + \text{Generator 2 MW} + \text{Generator 3 MW} \dots$
- Shadow price of unit output constraint is not reflected in LMP

- OATT Attachment K - Appendix & Operating Agreement, Schedule 1: Section 3.2.3 (f) Operating Reserves
  - Added language to clarify generators would not be eligible for Lost Opportunity Cost (LOC) credits for reductions associated with honoring stability limits

OATT Att K Appx Section 3.2.3 (f): Operating Reserves and parallel provision in OA Schedule 1 Section 3.2.3 (f)

- January 2021 – MRC vote
- February 2021 – MC vote
  
- Conforming manual revisions will be brought through the appropriate standing committees for endorsement following FERC approval of the proposal
  - Draft language can be found under the MIC and OC meeting materials:
    - [11/6/2020 OC – Item 11](#)
    - [12/2/2020 MIC – Item 10](#)

Facilitator:  
Lisa Morelli,  
[Lisa.Morelli@pjm.com](mailto:Lisa.Morelli@pjm.com)

SME/Presenter:  
Joe Ciabattone,  
[Joseph.Ciabattone@pjm.com](mailto:Joseph.Ciabattone@pjm.com)

## **Stability Limits in Markets and Operations**



### **Member Hotline**

(610) 666 – 8980

(866) 400 – 8980

[custsvc@pjm.com](mailto:custsvc@pjm.com)

# Appendix – Manual Revisions

- M28 Section 5.2.6
  - Added language to clarify that generators would not be eligible for Lost Opportunity Cost (LOC) credits for reductions associated with honoring stability limits

Manual 28: Operating Agreement Accounting

- M03 Section 3.9.1
  - Clarifies real power (MW) will be controlled using generator output constraint
- M11 Section 2.18
  - Modeling of generator stability limits in Day-ahead and Real Time Markets
  - Transparency reporting

Manual 03: Transmission Operations

Manual 11: Energy & Ancillary Services Market Operations