

Stability Limits – Manual 11, Manual 12 and Manual 28 revisions

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Mike Handlin
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Markets & Reliability Committee
April 27, 2022

- [Stability Limits in Markets and Operations](#) proposed revisions endorsed at the January 27, 2021 MRC
 - Generator Output Constraint solution package
- Revisions to OA, Schedule 1, section 3.2.3(f) to clarify generators would not be eligible for Lost Opportunity Cost (LOC) credits for reductions associated with honoring stability limits
 - Approved by FERC Order ER21-1802-000 (Feb 17, 2022)
- Changes effective June 1, 2022
 - Implementation details and conforming manual changes presented here

Component	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

Markets/Operations: Stability Limits

Modeling	Generator output constraint
Transparency	<ul style="list-style-type: none"> • Manual 3: 3.9.1 – Updated stability limitation process (OC) • Manual 11: 2.18 – New section on stability limit (MIC) • Manual 12: 5.5 – New section stability limited generation (OC) • Manual 28: 5.2.6 – Updated language regarding to stability limit (MIC)
Compliance and Notification	<ul style="list-style-type: none"> • Generator Owner notified via phone • Transmission Owner notified via TO Connection
Compensation	<ul style="list-style-type: none"> • Unit receives LMP for MWs • No LOC for the MWh reduction due to the stability limit



Manual 11 – Energy & Ancillary Services Market Operations

Zhenyu Fan

Sr. Engineer II, Real-Time Market Operations

Manual 11: Energy & Ancillary Services Market
Operations, Revision 120

- Section 2.18 Applying Stability Limits in the Market Clearing Engine
 - This new section describes the modeling, clearing and reporting on the stability limit in Market.
- Section 2.18.1 Station stability limit units are also not eligible for LOC credits for the MW reduction associated with honoring the stability limit.



Manual 12 – Balancing Operations, Vision 46

Mike Handlin
Supervisor, Dispatch

- Section 5.5 Generator Stability Limitations
 - New Section highlights Stability Limited Generation clarifying PJM and Member Actions
 - Reference to Stability Limitations outlined in M-03

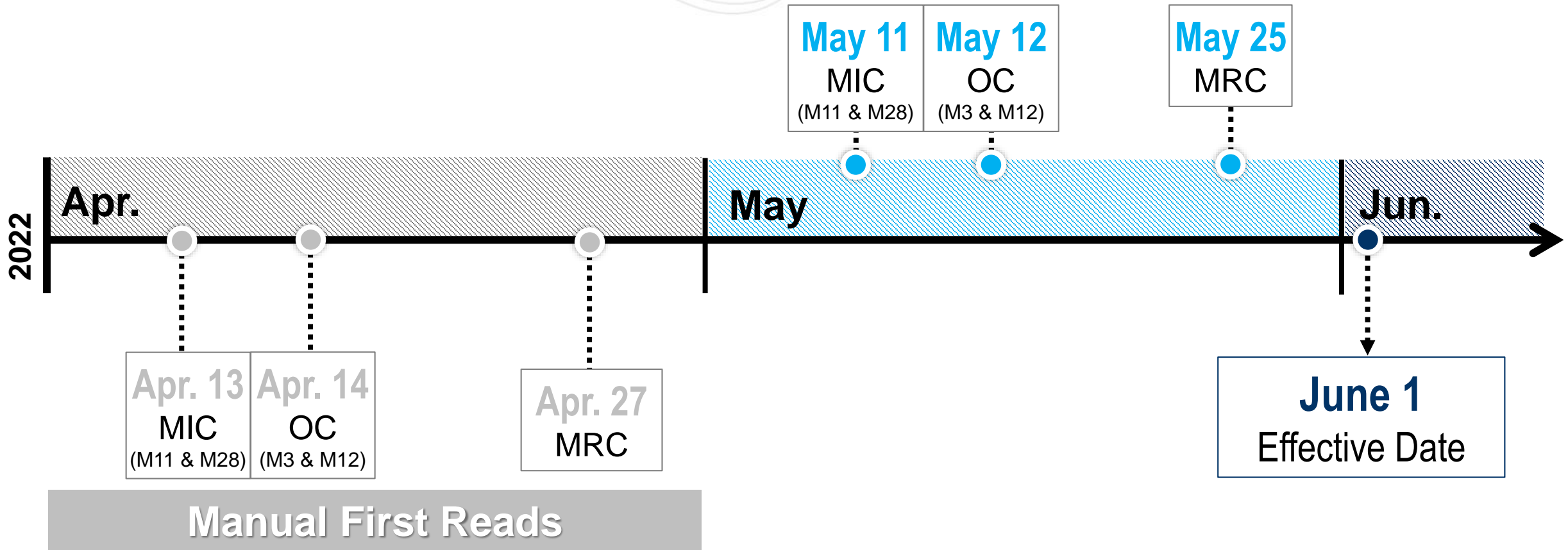


Manual 28 – Operating Agreement Accounting

Rebecca Stadelmeyer
Manager, Market Settlements Development

- 5.2.6, 5.2.6.1, 5.2.6.2 and 5.2.6.4
 - added clarification language that lost opportunity cost credits are not paid for the MWs associated with a stability limit reduction
 - added clarification language on how the Desired MW output will consider the stability limit in effect

Second Reads/ Endorsements



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Stability Limits M-11, M-12 & M-28 Revisions



Member Hotline

(610) 666 – 8980

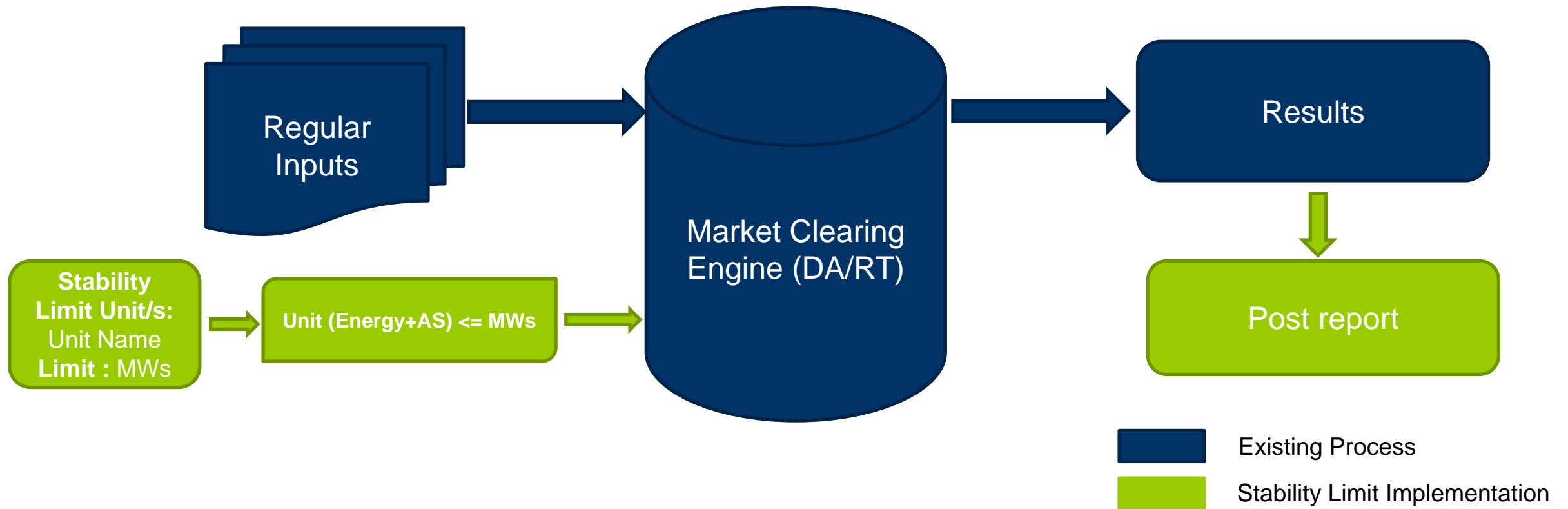
(866) 400 – 8980

custsvc@pjm.com

Appendix

- Output of generator(s) are controlled within the generator stability limit (MW)
 - 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 generator output constraint is not reflected in LMP

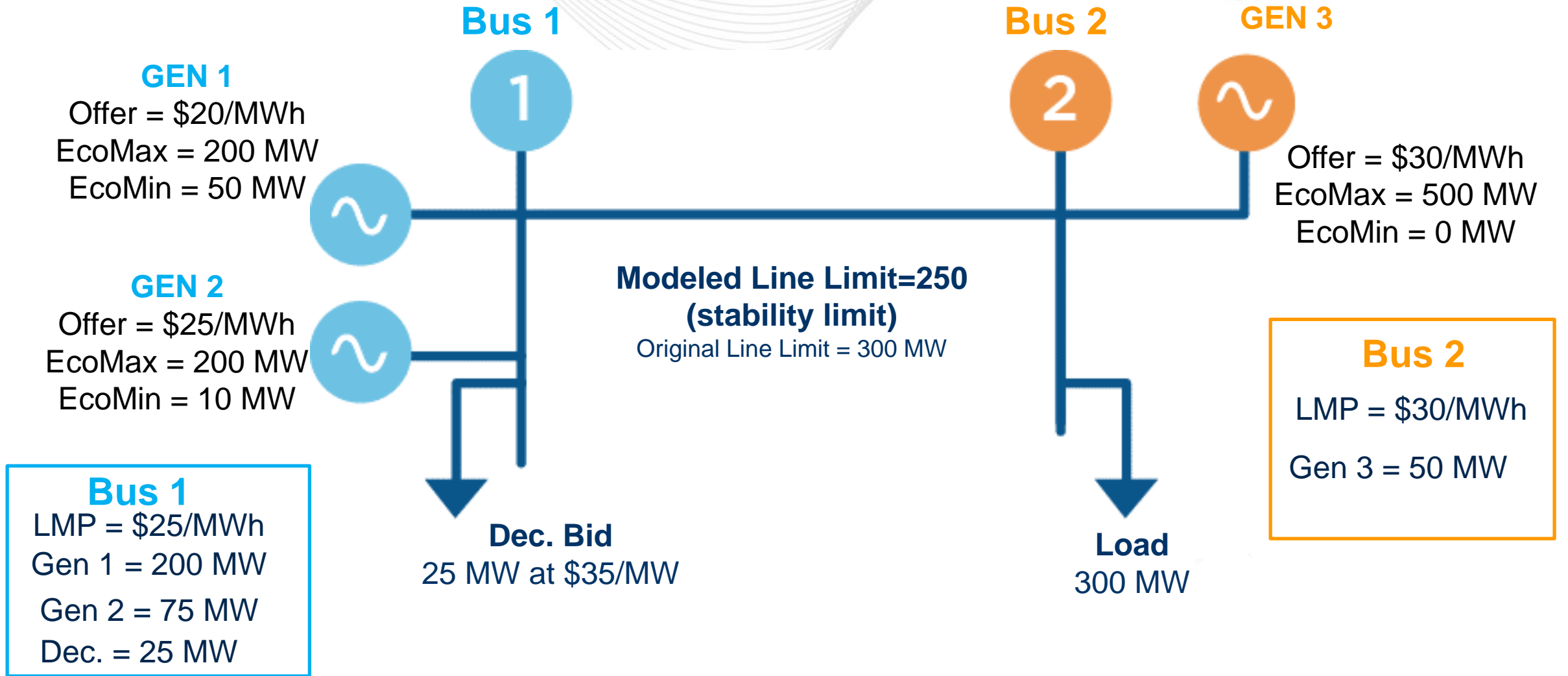
- Stability Inputs : Stability Unit/s, Stability limits (MWs)



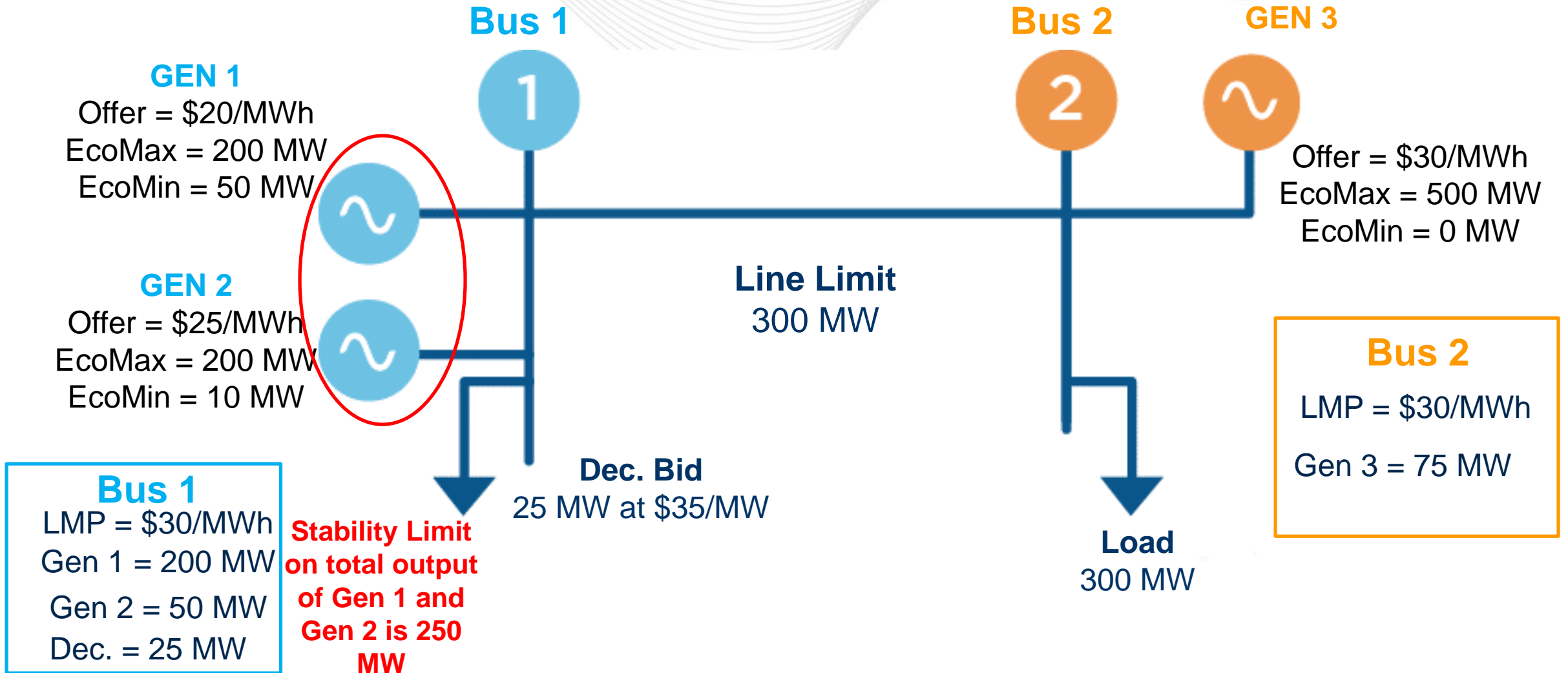
- Phone call to Generator Owner: Stability Limit & Unit/s
- Transmission Owner: notified via TO Connection
- Timing : Prior to Day Ahead Market Close or as soon as possible for stability limits required in real-time



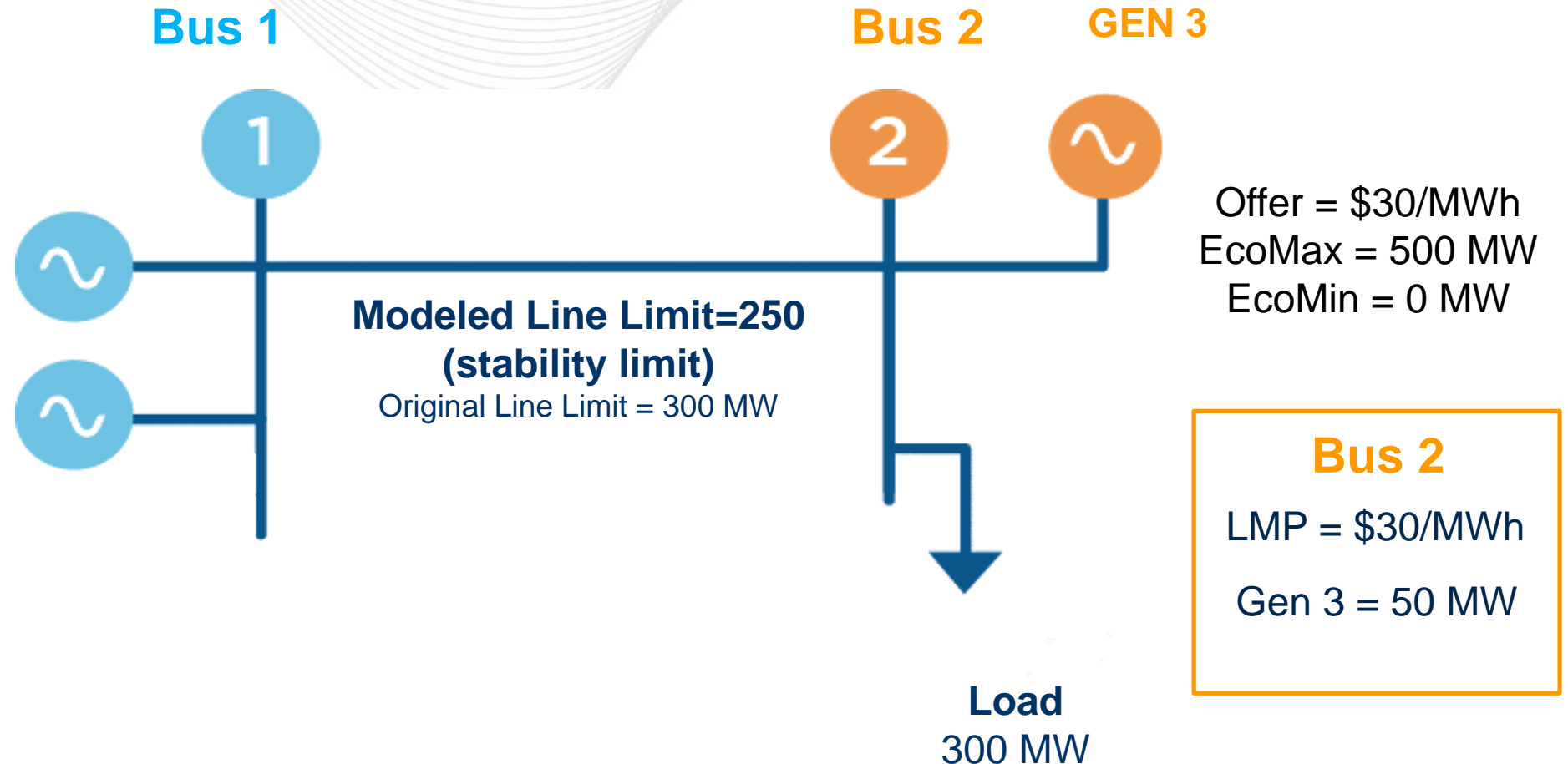
Clearing Stability Restricted units with Dec in current Thermal Surrogate approach (Day-Ahead Market)



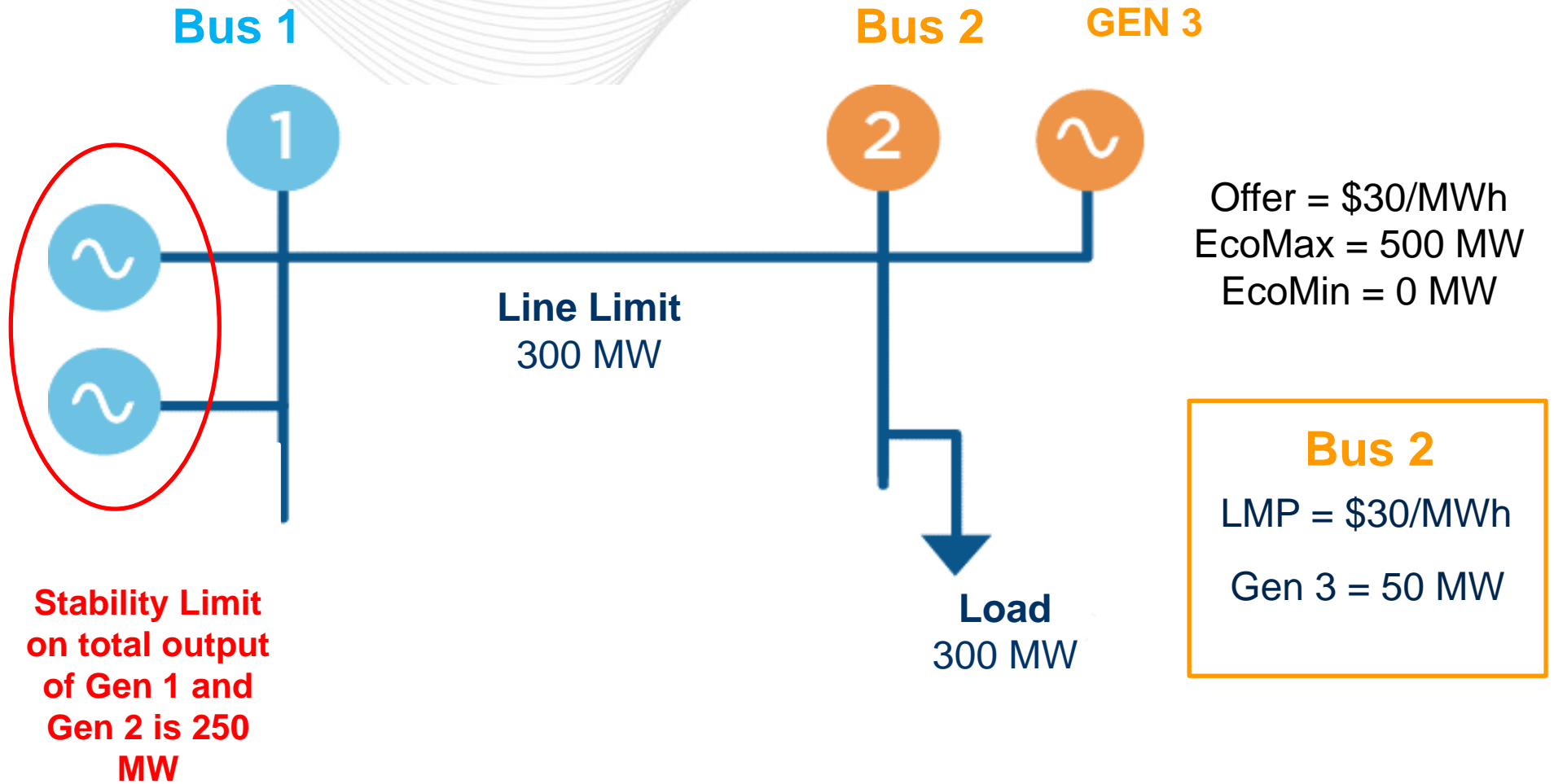
Clearing Stability Restricted units with Dec in new approach (Day-Ahead Market)



Clearing Stability Restricted units in current Thermal Surrogate approach (Real Time Market)



Clearing Stability Restricted units in new approach (Real Time Market)



Bus 1
LMP = \$30/MWh
Gen 1 = 200 MW
Gen 2 = 50 MW

Bus 2
LMP = \$30/MWh
Gen 3 = 50 MW

- Data will be made available to the market to increase transparency on
 - Frequency
 - Location
 - Number of affected units

- In order to respect confidentiality, all reporting will be aggregated to provide the most pertinent data.



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