



Capacity Excess Conditions

PJM State & Member Training Dept.



Objectives

Students will be able to:

- Identify the process and requirements for operating during capacity excess conditions

Capacity Excess Conditions

- Light Load Procedures
 - Failure of a Control Area to provide adequate generation control can result in:
 - Deviations in frequency
 - Inadvertent power flow
 - Stability issues
 - Transmission constraints
- For the RTO to meet its control requirements, it may be necessary to deviate from normal operating procedures during light load periods

Capacity Excess Conditions



Minimum Generation *Advisory* *

Purpose

- A Min Gen Advisory serves as a pre-alert to an actual Min Gen Alert
- This advisory also serves as a method of providing advanced notice of a potential Min Gen Event

PJM Actions

- The advisory is posted to the Emergency Procedures web site

*Note: Min Gen Advisory information will be added to PJM M-13 by the end of 2014

Capacity Excess Conditions

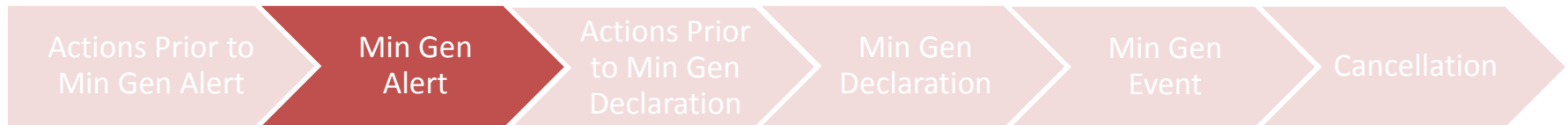


Actions *Prior to* Minimum Generation Alert

PJM Actions

- Prepares a Minimum Generation Worksheet
 - Determine if Minimum Generation Alert criteria is met
 - Determine if Light Load Procedures are required for the upcoming scheduling period
- Formulate a scheduling strategy for the light load period
- Hydro plant schedules are reviewed to ensure:
 - Pumping at pump storage facilities is maximized
 - Generation at run-of-river facilities is minimized

Capacity Excess Conditions



Minimum Generation Alert

Purpose

- To provide an early alert that PJM Emergency Procedures may be required

Trigger

- When the expected generation level is within 2,500 MW of normal minimum energy limits

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Minimum Generation Alert

PJM Actions

- Issues alert for specified light load period when conditions necessitate
 - Issued via All-Call and posts on selected PJM websites
- Provides information to members:
 - Adjusted Minimum generation
 - Valley and load estimate
 - Margin values

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Minimum Generation Alert

Member Actions

- Review normal and emergency limits with operating personnel
- Compile emergency reducible information and report via eDART
- Schedule maintenance, as appropriate, during light load periods
- Renew and update resource data in PJM's systems
- Contact PJM dispatch if ramp limits are prohibiting the ability to export energy from the PJM system during the projected period

Reporting Reducibles

- Generation dispatchers compile their emergency reducible information and report to the PJM Master dispatcher via eDART
 - The amount reported to the Reducible on Declaration Column is, by region, the Emergency Reducible Generation (ERG) that will be started down when PJM makes the Minimum Generation Emergency Declaration, before the actual Minimum Generation Event
 - The amount reported in the Total Reducible Generation is the total reducible generation available for both the Declaration and Event. Joint-owned generation is reported by the operating company

Reporting Reducibles

- eDART ERG Reporting Form

Emergency Reducible Generation				
User Name: seminarg1 Company: SBT Gen Comp 1				
Request ID: 12247 Timestamp: 11/18/2005 07:45				
Date: 11/18/2005 Period: MIDNIGHT				
Region	Reported		Actual	
	Total Reducible Generation	Reducible on Declaration	Declaration	Event
Western	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mid Atl	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Southern	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
NI	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Reporting Reducibles



Minimum Generation

Current MinGen

Reports

Upload

Download

Gen. Tickets

Trans. Tickets

Instantaneous Reserve Check

Minimum Gen. Report

PJM Status Report

NERC Data

Logout



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Calculating Reducibles

- **Min Gen** - difference between EcoMin and EmergMin
 - How to calculate reducibles
 - Why is this important
- **What might happen if your emergency reducibles aren't entered correctly?**

Calculating Reducibles

- The difference between economic min and emergency min
- During a minimum generation event, generators may be asked to reduce to emergency min
- If $\text{eco min} = \text{emerg min}$, the unit cannot reduce its output during a min gen

Calculate Reducibles

- PJM cannot effectively control the system during a Min Gen if units make eco min= emerg min
- If not correct, does not reflect the actual ability of the unit

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You have the following Unit in your portfolio....

Example

- Economic Maximum = 250 MW
- Current Output = 200 MW
- Economic Minimum = 125 MW
- Emergency Minimum= 100 MW

How much ERG do you report for this unit ?

25 MW

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Actions *Prior to* Minimum Generation Declaration

PJM Actions:

- Re-evaluate valley load estimate and amount of Spot-in transactions
- PJM dispatcher updates the amount of emergency reducible generation available to determine the final strategy
 - The final strategy includes the amount and time frames for the reducible generation to be reduced
- Reduce units to normal minimum generation, review units assigned to regulate then relieve units that are unable to regulate at or near normal minimum levels

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Minimum Generation Emergency Declaration

PJM Actions:

- PJM dispatcher will issue via the ALL-CALL a Minimum Generation Emergency Declaration
- Notify members of the survey results and strategy
- Posts the Declaration on Selected PJM web-sites

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Minimum Generation Emergency Declaration

- **Member Actions:**
 - Generation Dispatchers ensure their units are following PJM economic base points to Economic Minimum output
 - Wind Generation Operators will adjust Wind Turbine Control systems or manually adjust turbine output to achieve the desired SCED base point
 - Generation dispatchers reduce generation as reported via eDART on the minimum Generation Form in the Reducible on Declaration column

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Minimum Generation Emergency Declaration

- **Member Actions:**
 - Generation dispatchers determine the specific units that will be reduced and the sequence and timing of reductions based on the direction given by PJM
 - Generation dispatchers contact PJM Master Coordinator and report additional Reducible Generation that is reduced beyond what is reported on the Minimum Generation form

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Minimum Generation *Event*

Trigger

- A Min Gen Event is implemented when PJM dispatch can no longer match the decreasing load and utilization of emergency reducible generation as necessary

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Minimum Generation Event

PJM Actions:

- PJM dispatcher issues via the ALL-CALL a Minimum Generation Emergency Event and requests Local Generation dispatchers to reduce Emergency Reducible Generation (ERG)
 - In proportion to the total amount of ERG reported minus what was reported as being reducible on declaration
- If Transmission constrained, follow the Guidelines for Constrained Operations
- Posts the Declaration on Selected PJM web-sites
- Attempt to sell Emergency Energy to external systems

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Minimum Generation Emergency Event

PJM Actions:

- Reduce Network External Designated purchases as required to maintain system control after all internal PJM resources are reduced to Emergency Minimum Levels
- Recommend the shutdown of specific units that are not required for area protection during the current load period or the subsequent on-peak period

Example: If Member reported 200MW as total ERG with 100MW reported as Reducible on Declaration, 100MW would have been started down when PJM issued the Minimum Generation Emergency Declaration. If when issuing the Minimum Generation Event, PJM requests 20% reducibles, Member would reduce 20MW from the 100MW that was reported as targeted for reduction on the Event

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Minimum Generation Emergency Event

Member Action:

- Generation Dispatchers follow the direction of PJM dispatcher

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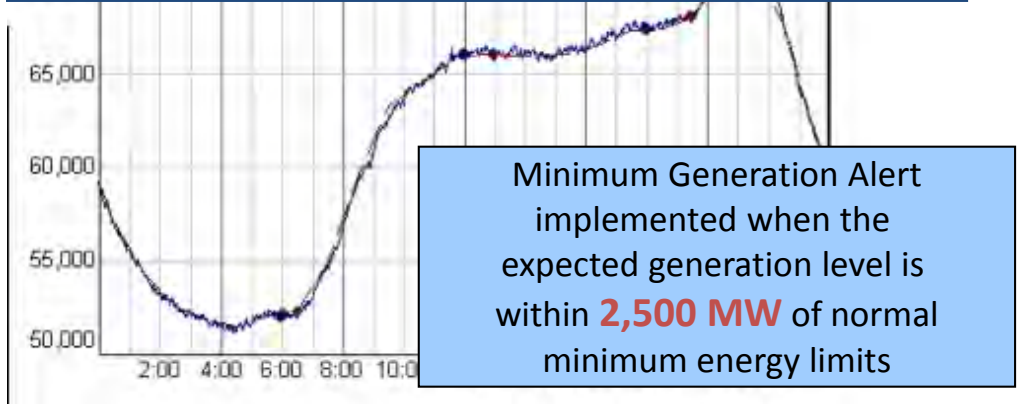


Cancellation

- The previous steps are followed in reverse order as the PJM RTO's load begins to exceed the generation
- **PJM Actions:**
 - A PJM dispatcher will cancel a Minimum Generation Emergency when actions taken under these procedures are no longer necessary
- **Member Actions:**
 - Generation dispatchers report actual generation that was reduced to the PJM dispatcher

Capacity Excess Conditions

05/21/2005 20:02
 PJM issued a Minimum Generation Alert for the midnight period of Sunday May 22, 2005



Minimum Generation Alert	
Request ID:	31682
Timestamp:	05/21/2005 21:56
Period:	MIDNIGHT
Date:	05/22/2005
Notes:	NY Spots - 1840 Mw Other Spots 1374 Mw Total Spots - 3214 Mw.
PJM Control Area	
Normal Minimum Generation:	56287
Bath County Pumps (-):	-1810
Generation Adjustment (+):	1500
Yard Creek Pumps (-):	-400
Muddy Run Pumps (-):	-960
Conowingo (+):	270
Safe Harbor / Holtwood (+):	93
Net Interchange (+/-):	1488
Spot Market (-):	-3214
RECS's (+):	45
Smith Mountain Pumps (-):	-80
Adjusted MinGen Override Calc:	
Misc Hydro (+/-):	383
Seneca Pumps (-):	-445
Wind Forecast (+/-):	
Adjusted Minimum Generation:	53157
Valley Load Estimate:	55370
Margin:	-2213

Min Gen Event from May 22, 2005

Operations Log: Sunday, May 22, 2005	
Thru 05/22/2005	Minimum Generation Alert in effect for the midnight period
05/22/2005 01:15	System cost at 0, curtailing total 860 MWs of spot in contracts by 2000
05/22/2005 01:20	Min Generation Emergency Declaration issued – expected 40% emergency reducibles by 0300
05/22/2005 02:15	Curtailing 225 MWs of Dispatchable Transaction
05/22/2005 05:45	Restoring 225 MWs of Dispatchable Transaction
05/22/2005 06:25	Issued Minimum Generation Event, Requested 30% reducible generation
05/22/2005 06:45	Curtailed Dispatchable Transaction 225 MWs
05/22/2005 07:15	Cancelled Minimum Generation Event, Requested restoration of 30% reducible generation
05/22/2005 07:45	Cancelled Minimum Generation Alert and Declaration

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Local Minimum Generation Events

PJM Actions

- Request local Generation dispatchers to reduce Emergency Reducible Generation
- Curtail dispatchable contracts and Spot Market imports
- Attempt to sell Emergency Energy to external systems
- After 100% Reducible Generation, reduce Network External Designated purchases
- Direct shutdown of effective units not required for area protection

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Local Minimum Generation Events

Member Actions:

- Generation dispatchers follow the direction of PJM dispatcher via eDART
- *(see eDART ERG Reporting Form in Manual 13 Attachment H)

Minimum Generation Exercise