Disclaimer

• This training presentation is provided as a reference for preparing for the PJM Certification Exam.
• Note that the following information may not reflect current PJM rules and operating procedures.
• For current training material, please visit: http://pjm.com/training/training-material.aspx
Interconnection Training Program

Load Scheduling
Generating Unit Capacity Limits
LS1

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State & Member Training
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LS1 - Generating Unit Capacity Limits
LS2 - Development and Use of Incremental Loading Tables
LS3 - Generation Production Costs, Scheduling Rate and Operating Rate
LS4 - Load Forecasting
LS5 - Generator Outages & eDART
LS6 - Generator Performance; eGADS & CODA
LS7 - PJM Security Constrained Economic Dispatch System (SCED)
LS1 Objectives

• Define the meaning and significance of installed capacity
• Describe the meaning and significance of scheduled capacity
  – Emergency minimum
  – Normal minimum
  – Normal maximum
  – Emergency maximum
• Describe the meaning and significance of operating capacity
• Describe the meaning and significance of dispatch lambda
Unit Capacity Limits

• Generating units each have designated capacity values.
• Used by PJM to schedule required generation on and off the system for demand, reserves and regulation.
• Play an important role in reliability and economy of the system.
Unit Capacity Limits

- Installed Capacity
- Scheduled Capacity Limits
  - Emergency Minimum
  - Economic Minimum
  - Economic Maximum
  - Emergency Maximum
- Operating Capacity
- Dispatch Lambda
Installed Capacity

- Based on summer rating of plant equipment as designed. (All components in service)
- Used for Operations Planning & System Planning Studies.
- Not used in day to day pool operations, but!!!!
- Used in eRPM and Capacity Market.
- Applies to all units designated as an installed capacity resource.
- In MW - Aux. Pwr. = Net MW
• PJM Installed Capacity is approximately 167,000 MW (Iron in the ground, does not include imports/exports to any company's).
• FERC approved regional transmission expansion plan (RTEP).
Scheduled Capacity Limits

- **Emergency Maximum** = highest short term MW output
- **Economic Maximum** = highest MW output in response to cost
- **Economic Minimum** = lowest MW output in response to cost
- **Emergency Minimum** = lowest short term MW output
GENERATION (MW)

MAXIMUM ENERGY – Highest short term MW output a generator can produce

NORMAL MAXIMUM – Highest continuous economic MW output a unit will produce

NORMAL MINIMUM – Lowest continuous MW output a unit can produce without unusual operating procedures

EMERGENCY MINIMUM – Lowest short term MW output a unit can produce
Scheduled Capacity Limits

- Used for scheduling generation
- Used in Markets Database, Resource Scheduling & Commitment (RSC) program, and Study Network Analysis (STNET)
- Based on Day-ahead Market and Real-time Balancing Market conditions
- Should be as accurate as possible
- Applies to all units designated as an installed capacity resource
Operating Capacity

- Real time operations
- Expected highest available capacity at time of peak.
- Used by PJM Master Coordinator to keep capacity sheets.
- Sum of all units operating capacities = system operating capacity.
- Applies to all units scheduled to run in that period.
Dispatch Lambda

• Used in Dispatch Lambda program for economic dispatch.
• Based on actual conditions
• Applies only to available operating units
• $/MWhr price signal
• Does not reflect unit ramping limitations
Economic Basepoint

- Used in dispatch program for economic dispatch.
- Based on actual conditions
- Applies only to available operating units
- Expressed in megawatts
- Does reflect unit ramping limitations
Time to reflect on the lesson
Exercise LS-1.1

What did he say?
Discussion Questions

• Explain how operating capacity on a generating unit may possibly exceed scheduled capacity.

• Ans. Equipment returning from an outage.
Discussion Questions

• For a steam turbine generating unit, why would the maximum output be normally higher in winter than in summer?

• Ans. Circulating water temperature into the condenser is lower.
Discussion Questions

• Why would the same situation as the previous question hold true for a combustion turbine?

• Ans. Combustion turbine output increases with denser colder air.
Discussion Questions

• List some of the steps that may be taken at a generating station in order to achieve maximum emergency generation.

• Ans.
  – Over-fire boiler
  – Exceed opacity limits
  – Add start-up oil
  – Close extraction valves
Questions

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