PJM Manual 21:
Rules and Procedures for Determination of Generating Capability Summary
Setting and Maintaining Capability of Generators

Jerry Bell

Resource Adequacy Planning

Capacity Capability Senior Task Force

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Manual 21 Overview

- To set forth rules as specified in RAA Schedule 9:
  - Determining capability (ICAP)
  - Testing rules
  - Testing rule changes commencing DY22/23

- Also included is a CIR section that explains CIRs their acquisition, retention and forfeiture in accordance with section 230 of the OATT
- Generator capability tests are used for proving ICAP and retaining CIRs

Setting ICAP (Conventional Units)

- Steam, Nuclear, Combined Cycle, Gas Turbines, Reciprocating Engines, Fuel Cells
  - Must amend the units engineer/architect rating using the appropriate correction curves
  - Rating must be based on the generator site conditions coincident with the last 15 years PJM summer/winter peaks (also known as summer/winter conditions)
  - Generator site conditions include, but are not limited to:
    - Elevation
    - Wet Bulb Temperature
    - Dry Bulb Temperature
    - Relative Humidity
    - Barometric Pressure

Setting ICAP (Intermittent Units, excluding wind and solar)

- Landfill Diesels, Run of River Hydro with no pooling/storage capability
  - Must amend the units engineer/architect rating using the appropriate correction curves
  - Rating must be based on the generator site conditions coincident with the last 15 years PJM summer/winter peaks (also known as summer/winter conditions)
  - Generator site conditions include, but are not limited to:
    - Elevation
    - Forebay elevation (head)
    - Streamflow
    - Landfill gas production rate

Setting ICAP (Capacity Storage and Hydro with storage)

- Pumped Storage, Run of River Hydro with pooling/storage capability, Non-Hydro Storage (Battery, Flywheel, etc.)
  - Must amend the units engineer/architect rating using the appropriate correction curves
  - Rating must be based on the generator site conditions coincident with the last 15 years PJM summer/winter peaks (also known as summer/winter conditions)
  - Generator site conditions include, but are not limited to:
    - Elevation
    - Forebay elevation (head)
    - Streamflow
    - State of Charge

Manual 21, Section 2.1.5

"All or any part of a unit's capability that can be sustained for a number of hours of continuous operation commensurate with PJM load requirements, specified as 10 hours, shall be considered as unlimited energy capability. All or any part of a unit's capability that cannot be sustained for a number of hours of continuous operation commensurate with PJM load requirements, specified as 10 hours, shall be considered as limited energy capability. Such limited energy capability will be used to meet the energy requirements of PJM and depending on the extent to which it meets these requirements such capability may be reduced as provided in Schedule 9 of the Reliability Assurance Agreement (RAA)."

This section is meant to ensure that if a unit cannot maintain its output at its ICAP rating for a minimum ten contiguous hours, it is considered limited and its ICAP should be reduced so that it can provide output at its ICAP rating for ten hours or more.

This is the "ten hour rule" and it is stated as a rule for a ***unit's*** capability.

Pending changes to Manual 21 and RAA Schedule 9

- Commencing DY 22/23 all Capacity Storage and Intermittent units (excluding wind and solar) must test simultaneously (M21, section 1.4.3).
- All units must be rated for simultaneous operation (M21, section 1.4.4).
- Pending changes to RAA, Schedule 9, categorize all units into three categories:
    - Continuous
        - Nuclear, Steam, Combined Cycle, Gas Turbine, Reciprocating, Fuel Cell
    - Limited
        - Pumped Storage, Run of River Hydro with pooling/storage, Battery, Flywheel, and other non-hydro storage
    - Intermittent
        - Wind, Solar, Run of River Hydro with no pooling or storage, Landfill Gas units with no supplemental or backup fuel
- These changes ensure that all limited units are subject to the ten hour rule on a plant basis

The ICAP-UCAP Relationship

- ICAP is the installed capacity of a generating unit at the time of the expected PJM summer/winter peak
- UCAP is the ICAP reduced for forced outages
- UCAP is Unforced Capacity
- UCAP=(1-EFORd) * ICAP
- This calculation is used for all capacity resources other than wind and solar
- Wind and Solar UCAP is calculated directly from summer production data

Wind and Solar UCAP

- UCAP for existing wind and solar units
  - calculated by using actual production data
    - Hours ending 15 thru 18 on all summer days 6/1 thru 8/31 (368 hours per summer)
    - Average for the latest three years
- UCAP for new wind and solar units
  - calculated by using capacity factors
    - Class average capacity factors
    - Requested/customized capacity factors
      - Using modeled or actual (wind or irradiance) data from one of the many simulation products available
      - Evaluation and approval by PJM

CIR Evaluation

- CIR evaluation
  - For units that perform capability tests
    - Nuclear, Steam, Gas Turbine, Reciprocating, Fuel Cell, Hydro
    - If the highest net corrected summer verification test of the most recent three years meets or exceeds the CIR level, the unit retains its CIRs
    - If not, the unit loses CIRs equal to the difference between the CIR level and the highest net corrected summer verification test of the most recent three years
  - For wind and solar units
    - If the highest average production value (average MW value for 368 hours each summer) of the most recent three years meets or exceeds the CIR level, the unit retains its CIRs
    - If not, the unit loses CIRs equal to the difference between the CIR level and the highest average production value (average MW value for 368 hours each summer) of the most recent three years

ICAP/UCAP reduction caused by loss of CIRs

- CIR reduction
  - For units that perform capability tests
    - Nuclear, Steam, Gas Turbine, Reciprocating, Fuel Cell
    - If a unit loses CIRs and its new CIR level is lower that its existing ICAP value in the capacity market, a CAPMOD is required to reduce the ICAP of the unit to its new CIR level or lower on February 1 prior to the next Delivery Year
  - For wind and solar units
    - If a unit loses CIRs and its new CIR level is lower that its existing UCAP value in the capacity market, a CAPMOD is required to reduce the UCAP of the unit to its new CIR level or lower on June 1 effective with the beginning of the next Delivery Year

Questions?

Contact info

- Jerry Bell
- Jerry.Bell@pjm.com
- 610.666.4526