

Appendix B: Calculating Capacity Values for Intermittent Capacity Resources

PURPOSE:

This appendix describes the procedure for the calculation of capacity values for all intermittent capacity resources such as wind and photovoltaic generators.

DEFINITIONS

1. Capacity Value for an intermittent capacity resource represents that amount of generating capacity, expressed in MW, that it can reliably contribute during summer peak hours and which can be offered as unforced capacity into the PJM capacity markets.
2. “Capacity Factor” for an intermittent capacity resource is a factor based on historical operating data and/or the Class Average Capacity Factor, and is used in the calculation that determines an intermittent capacity resource’s Capacity Value.
3. The intermittent capacity resource’s “Net Maximum Capacity” is the manufacturer’s output rating less the Station Load where “Station Load” refers to the amount of energy that is consumed to operate all auxiliary equipment and control systems.
4. Intermittent capacity resources with three or more years of applicable operational data are referred to as “Mature.” Those with fewer than three years of data are “Immature.”
5. “Class Average Capacity Factor” is a factor that is used only in the calculations for the Capacity Value of an immature intermittent capacity resource. Class average capacity factors shall be determined and periodically updated by PJM based upon review of operating data for similar units and/or engineering studies for future installations.
6. “Hourly output” is the average of the metered outputs, in MW, integrated over a one-hour period.
7. “Summer Day” is defined as any day from June 1 through August 31, inclusive.
8. “Summer Period” is the period from June 1 through August 31, inclusive.

9. "Peak Hours" are those ending 3, 4, 5, and 6 PM Local Prevailing Time.

10. "Summer Peak Hours" means all "Peak Hours" for all of the "Summer Days."

~~10.~~ 11. "Summer Calculation Hours" means all "Summer Peak Hours" for which PJM did not direct the resource to reduce its output.

CALCULATION PROCEDURE

1. General Approach - The calculation of a capacity value for a particular intermittent capacity resource for a particular year is performed by first computing its unique single year capacity factors for each of the prior three summers. An intermittent resource may consist of a number of individual generating units metered and interconnected at a single point. Groups of wind turbines meeting these criteria are referred to as wind energy projects. Those single year capacity factors are based upon operating data for each of those summers, or in the case of an immature intermittent capacity resource, the single year capacity factor is assigned the value of the Class Average Capacity Factor for each summer where there is no or incomplete data. The mean of single year capacity factors for each of the prior three years results in a Capacity Factor representative of the three prior years. That Capacity Factor, when multiplied by the current Net Maximum Capacity yields the current capacity value for that intermittent capacity resource. This two step process accommodates any changes in the Net Maximum capacity that may have occurred during the prior three summers of operation. A detailed outline of this approach (addressing both mature and immature intermittent capacity resources) is as follows:

- A. Sum all of the "hourly outputs" for each of the summer calculationpeak hours in the year that is three years prior to the current year.
- B. Then, for each of those same summer calculationpeak hours, sum the Net Maximum Capacity values.
- C. The quotient of the summed summer calculationpeak hour outputs (a) divided by the summed summer calculationpeak hour Net Maximum Capacities (b) will yield a single year capacity factor for that year.
- D. If there is no or incomplete operating data for one or more of the summers (immature Intermittent capacity resource) then the single year capacity factor for each of those years is assigned the value of the Class Average Capacity Factor.
- E. Repeating steps (A) through (D) above for each of the two intervening years (current year minus 2, and current year minus 1) will generate two more single year capacity factors, one for each of those years.
- F. The Capacity Factor to be used in the current year is the mean (arithmetic average) of the three single year capacity factors calculated in steps (C) and (D) above.



- G. Capacity factors shall be calculated annually following the summer peak period and be applicable for the delivery year beginning the following June.
- H. Currently effective class average capacity factors are 13% for wind and 38% for solar units.
- I. Owners of immature intermittent units may substitute an alternate class average capacity factor with suitable documentation and approval by PJM.
- J. The current Capacity Value is then calculated by multiplying the applicable Capacity Factor from (G) above by the current Net Maximum Capacity of the intermittent capacity resource.