

Attachment D:

Dependable Maximum Net Capability, Audit Forms, the Procedure to Adjust a Resource's Proven Maximum Production Capability and the Procedure to Weather Adjust DMNC Test Data

1.0 Introduction

All NYISO Resources are required to establish DMNC ratings to be eligible to become Installed Capacity Suppliers. They are also required to retest during each DMNC Test Period within each Capability Period in which it has committed Unforced Capacity. This Attachment establishes the requirements that must be met by such Resources to establish a uniform rating. It provides guidelines for how capability should be established, and how Resources will be audited by the ISO.

PMPC and DMNC test data must be submitted to the NYISO's Resource Reliability Department. Documentation submitted via e-mail is preferred, however, delivery by regular mail, courier service or fax is also acceptable. Documentation should be addressed as follows:

Email: generator_test_data@nyiso.com

FAX: (518) 356-6208

Manager, Resource Reliability
c/o New York Independent System Operator
290 Washington Ave. Extension
Albany, NY 12203

For the purposes of rating and auditing Resources, as described in this Attachment, the following classification of Resources is used and the following forms are included in this attachment:

- ? Steam Generation
- ? Hydro Generation
- ? Internal Combustion and Combustion Turbine Generation
- ? Combined Cycle Generation
- ? Other (Includes Intermittents)

1.1 Procedure to Adjust a Resource's Proven Maximum Production Capability

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A Resource's Proven Maximum Production Capability (PMPC) may be adjusted at any time. Five (5) business days are required to process the PMPC request and to be made available in the Market Information System.

? Provide the appropriate Dependable Maximum Net Capability Audit Form for the type of Resource being reported.

? Check the PMPC box at top left of form. If only the PMPC box is checked, then DMNC information is not required with this submission.

1.2 Procedure to Weather Adjust DMNC Test Data

All DMNC tests on internal combustion, combustion units and combined cycles units must be temperature adjusted. The temperature to be used for the temperature adjustment is the average ambient and cooling system temperature at the generator location experienced at the time of the TD peak during the "previous" four (4) relevant Capability Periods. The "previous" four (4) relevant Capability Periods do not include the Capability Period in which the DMNC test was performed. The dates and times of the TD peak in each Capability Period are posted on the ISO website at:

www.nyiso.com/markets/icapinfo.html under "General Information."

? Determine the weather adjusted DMNC rating for the generator using the manufacturer's provided temperature adjustment curves and generator specific curves (if applicable) produced from historical experience.

? Provide both sets of ratings and temperature adjustment curves.

? The higher of the two values may be claimed. The ISO may lower the value claimed for the weather-adjusted DMNC, if the provided temperature adjustment curves are significantly different.

Data should be submitted in accordance with the timeline as posted on the NYISO website at www.nyiso.com/markets/icapinfo.html and Section 4.2 of this Installed Capacity Manual.

2.0 Standard Generating Resources

Standard generating Resources include all Resources registered with the ISO represented in the MIS except as noted below.

Standard generating units must regularly achieve DMNC capability when called upon to do so. Capabilities must reflect, with reasonable accuracy, a unit's physical characteristics, the interdependence of common elements and auxiliaries located within a multi-unit generating station, and the deployment of operating personnel required for unit and/or station achievement

of DMNC rating. Details pertaining to establishing and auditing of DMNC values for standard generating units are included below.

2.1 Intermittent Power Resources

Intermittent Power Resources are capacity resources that depend on wind or solar energy for their fuel, and whose output amount and availability are not subject to the control of the ISO or the plant operator because of the source of fuel (e.g., wind, solar).

2.2 Run-of-River Hydro Units

Run-of-river hydro units will be subject to the DMNC test procedures as delineated in Section X, below.

2.3 Energy Limited Resources

Resources that, due to design considerations, environment restrictions on operations, cyclical requirements, such as the need to recharge or refill, or other non-economic reasons, are unable to operate continuously on a daily basis but are able to operate for at least four (4) consecutive hours each day. These include pumped storage hydro units that must be able to be dispatched by NYISO.

2.4 External Resources

The ISO will honor the capability tests as applicable in the PJM or ISO-NE control area provided they are reasonably consistent with testing requirements for similar units in the NYCA. In addition to bidding, scheduling and notification requirements of any Installed Capacity resource, these units must demonstrate deliverability to the NYCA when scheduled in the DAM and when called on during an SRE or an emergency condition, in accordance with the Market Services Tariff.

2.5 Special Case Resources

Special Case Resources must comply with the testing and reporting requirements in Section 4.12 of this Installed Capacity Manual as well as this Attachment D and Attachment K.

2.2 DMNC Test Periods

The DMNC Test Demonstration Periods are defined as subsets of the respective Summer and Winter Capability Periods. DMNC rating for all Resources must be demonstrated in each of these DMNC Test Periods unless they were not a committed Installed Capacity Resource during any part of the applicable Capability Period. The Summer Demonstration Period begins on June 1 and ends on August 31. The Winter Demonstration Period begins on December 1 and ends on the last day of the immediately following February. In addition, the DMNC test period or the equivalent production data is more specifically defined as being limited to the time period beginning in hour 0800 and ending hour 2200, excluding NERC Holidays.

3.1 DMNC Ratings

DMNC ratings represent the Summer and Winter Capability of a generating unit or a combination of units. DMNCs are the maximum dependable load carrying ability, in megawatts truncated to one decimal place (full 100kW blocks), of such unit or units, excluding capacity required for station use. These ratings are the base Installed Capacity values that will be used to calculate Unforced Capacity values in accordance with Attachment J. To ensure a consistent basis for establishing the capability for generating units, Market Participants should follow the guidelines provided in Section Y of this Attachment.

3.2 DMNC Audits

The ISO has the right to conduct audits for the purpose of establishing, restoring or verifying the DMNC rating of all generating units.

4.0 General Requirementst for DMNC testing of all Resources

4.1 [Test requirements for Fossil or Nuclear Steam, Internal Combustion or Combustion Turbine, and Comined Cycle plants are largely unchanged except as noted above un Section 2.0, above]

The forms (Excel Workbook) for submitting DMNC and/or PMPC test results information are posted on the ISO website at:

<http://www.nyiso.com/markets/icapinfo.html>

4.2 DMNC for Hydroelectric generating Stations

Hydroelectric generating stations shall have DMNC ratings that reflect variations in stream flow over the course of each Capability Period. DMNC capability calculations will utilize hourly river flow rate data over the applicable DMNC Test Period for each Capability Period. The DMNC rating for hydroelectric generators will be the average of the highest 4-hour production period for each month in the DMNC Test Period between 1400 and 1800 hours. The forms (Excel Workbook) for submitting this information are posted on the ISO website at:

<http://www.nyiso.com/markets/icapinfo.html>

4.3 DMNC for Intermittent Generators

This section describes the general procedure for calculating UCAP values for all intermittent capacity resources. It is intended to be the basis upon which to create capacity value calculation procedures for specific types of intermittent generators such as wind farms and photovoltaic generators. The forms (Excel Workbook) for submitting DMNC and/or PMPC test results information are posted on the ISO website at:

<http://www.nyiso.com/markets/icapinfo.html>

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DEFINITIONS

1. Unforced Capacity value for an Intermittent Power Resource represents that amount of generating capacity, expressed in MW, that it can reliably contribute during peak hours and which can be traded as Unforced Capacity in the NYCA capacity markets.
2. “Capacity Factor” for an Intermittent Power Resource is a factor based on historical operating data and/or the Class Average Capacity Factor, and is used in calculating that Intermittent Power Resource’s Unforced Capacity value.
3. The intermittent capacity resource’s DMNC 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 Power 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.” [may not need this distinction]
5. “Class Average Capacity Factor” is a factor that is used only in the calculations for Unforced Capacity rating of an immature intermittent capacity resource. Initially, the Class Average Capacity Factor for Wind Generators is set at 15% [just a placeholder for now] but is subject to change upon the emergence of operating data from additional wind farms upon which to base the analysis.
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. “Winter Day” is defined as any day from December 1 through the last day in February, inclusive.
9. “Peak Hours” are those ending at 3, 4, 5, and 6 PM.
10. “Summer Peak Hours” means all “Peak Hours” for all of the “Summer Days.”

CALCULATION PROCEDURE

General Approach - Calculating an Unforced Capacity value for a particular Intermittent Power Resource for a particular year is performed by first computing its unique capacity factor. That capacity factor is based upon operating data for each Capability Period, or in the case of an immature Intermittent Power Resource, the capacity factor is assigned the value of the Class Average Capacity Factor for the Capability Period where there is no or incomplete data. The Capacity Factor, when multiplied by the current DMNC yields the current Unforced Capacity value for that Intermittent Power Resource. This process accommodates any changes in the DMNC capacity that may have occurred over time and is as follows:

- A. Sum all of the “hourly outputs” for each of the peak hours in the most recent Capability Period.
- B. Then, for each of those same peak hours sum the DMNC values.

- C. The quotient of the summed peak hour outputs (a) divided by the summed peak hour DMNC values (b) will yield a capacity factor for that year.
- D. If there is either no, or incomplete, operating data for one or more of the Capability Periods' 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. The current Unforced Capacity value is then calculated by multiplying this Capacity Factor by the current DMNC of the Intermittent Capacity Resource.

Simplified Method (Constant Net Maximum Capacity Factor) - The calculation for a capacity factor (steps (A) through (D) above) is simplified significantly if the DMNC is constant during each Capability Period for which it is being calculated. In this case the process is merely to average the Hourly Outputs for the Peak Hours and divide that by the DMNC for that Capability Period. The result will be the capacity factor for that Capability period. Again, the capacity factor for each Capability Period in which there is no or incomplete operating data is the current Class Average Capacity Factor. The process for calculating the Capacity Value is then as described in steps (E) above.

1. General Approach - The calculation of a Capacity Value for a particular wind farm for a particular year is performed by first computing the unique single year capacity factors for each of the prior three summers. Those single year capacity factors are based upon operating data for each of those summers, or in the case of an immature wind farm, the single year capacity factor is assigned the value of the Wind Class Average Capacity Factor for each summer where there is no or incomplete operating 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 wind farm. This two-step process accommodates any changes in the Net Maximum Capacity that may have occurred during the prior three summers of operation or the current year of operation. A detailed outline of this approach (addressing both mature and immature wind farms) is as follows:
 - a. Sum all of the "hourly outputs" for each of the summer peak hours in the year that is three years prior to the current year.
 - b. Then, for each of those same summer peak hours sum the Net Maximum Capacity values.
 - c. The quotient of the summed summer peak hour outputs (a) divided by the summed summer peak 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 wind farm) then the single year capacity factor for each of those years is assigned the value of the Wind 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. The current Capacity Value is then calculated by multiplying this Capacity Factor from (f) above by the current Net Maximum Capacity of the wind farm.
2. Simplified Method (Constant Net Maximum Capacity Factor) - The calculation for a single year capacity factor (steps (a) through (e) above) is simplified significantly if the Net Maximum Capacity is constant during the Summer Period for which it is being calculated. In this case the process is merely to average the Hourly Outputs for the Summer Peak Hours and divide that by the Net Maximum Capacity for that summer. The result will be the single year capacity factor for that year. Again, the single year capacity factor for each year in which there is no or incomplete Summer Period operating data is the current Wind Class Average Capacity Factor. The process for calculating the Capacity Value is then as described in steps (f) and (g) above.