

Attachment J:

Implementation of Unforced Capacity for Installed Capacity Supplier Qualifications

1.0 Fundamental Formulas

$$(1-1) \quad UCAP = (1 - EFOR_D) \times DMNC$$

$$(1-2) \quad EFOR_D = \frac{f_r \times FOH + f_p \times EFPOH}{SH + f_r \times FOH}$$

Note:
 $EFPOH = EFOH - FOH$

$$(1-3) \quad f_r = \frac{\frac{1}{r} + \frac{1}{T}}{\frac{1}{r} + \frac{1}{T} + \frac{1}{D}}$$

Note: If r or T equal zero, f_r equals 1. (to be confirmed)

$$(1-3a) \quad r = \text{average forced outage duration}$$

$$(1-3b) \quad r = \frac{FOH}{\text{number of forced outages}}$$

$$(1-3c) \quad T = \text{average time between calls for a unit to run}$$

$$(1-3d) \quad T = \frac{RSH}{\text{number of attempted starts}}$$

$$(1-3e) \quad D = \text{average run time}$$

$$(1-3f) \quad D = \frac{SH}{\text{number of successful starts}}$$

$$(1-4) \quad f_p = \frac{SH}{AH}$$

Note: UCAP values will be calculated monthly for each Resource based on a rolling twelve-month calculations. The formulas for calculating these values (including treatments for class averages where new units are being phased in) are included here for each type of Resource.

2.0 Definitions

UCAPUnforced Capacity

EFOR_D.....Equivalent Demand Forced Outage Rate

DMNC.....per Tariff definition

Net Dependable Capability = maximum monthly 1-hour net output, adjusted for TD peak-Load temperature

f_ffull f-factor

f_p partial f-factor

FOH.....Full Forced Outage Hours

Forced Outage.....per Tariff definition

EFOHEquivalent Full Forced Outage Hours: Sum of all $(D_i * T_i / C_i)$ -- The number of hours a unit was involved in an outage expressed as equivalent hours of full forced outage at its maximum net dependable capability.

SH.....Service Hours: The time a unit is electrically connected to the system - Sum of all Unit Service Hours.

AH.....Available Hours: The time a unit is capable of producing energy, regardless of its capacity level -- Sum of all Service Hours + Reserve Shutdown Hours + Pumping Hours + Synchronous Condensing Hours.

RSH.....Reserve Shutdown Hours: The time a unit is available for service but not dispatched due to economic or other reasons.

PH.....Period hours equals 24 times the number of days in the reporting period.

r average forced outage duration = FOH / (number of forced outages)

T average time between calls for a unit to run = RSH/(number of attempted starts)

Daverage run time = SH / (number of successful starts)

D_iCapacity deration for forced outage i or forced deration (NERC U1, U2, D1, D2...)

T_i time accumulated during forced outage i, in hours, and

C_{fi}.....Net Dependable Capability or DMNC

3.0 Calculations:

In general, all generating Resources with nameplate capacities greater than 10 MWs or aggregated plants greater than 25 MW are expected to provide the full GADS Data set defined in Attachment K. Units for which the full GADS Data set is provided will have their UCAP based on EFOR_D according to Section 3.1 below. All other generating units will be rated based on equivalent GADS Data as in Section 3.2. Special Case Resources will have their UCAP based on effective demand reduction determined in Section 3.3.

3.1 UCAP based on EFOR_D

A rolling, cumulative, twelve-month EFOR_D will be calculated for each Resource that submits GADS Data using the GADS reporting format in Attachment K. The EFOR_D for month (m) will be based on GADS Date for months, m-14, through month, m-3. (For example, EFOR_D for August will be based on data submitted for June of the prior year through May of the current year).

$$EFOR_{Dgm} = \frac{IST_{ge}}{12} \times \frac{f_{gbe} FOH_{gbe} + f_{pgbe}(EFOH_{gbe} - FOH_{gbe})}{(SH_{gbe} + f_{gbe} FOH_{gbe})} + \left(1 - \frac{IST_{ge}}{12}\right) CEFOR_{Dg}$$

where:

$EFOR_{Dgm}$ is the Equivalent Demand Forced Outage Rate calculated for Resource g that will be used to determine the amount of unforced capacity that Resource will be permitted to provide in month m .

IST_{ge} is the number of months that Resource g had been in service as of time e (0 if generator g was not in service as of time e ; 12 if Resource g was in service from months m-14 through month m-3).

f_{gbe} , FOH_{gbe} , f_{pgbe} , $EFOH_{gbe}$, and SH_{gbe} are, respectively, the values of the variables f_f , FOH , f_p , $EFOH$ and SH (as defined below) calculated for supplier g for the period beginning at time b and ending at time e ;

e is the end of the month occurring three months before month m , (e.g., if month m is September 2001, then e is the end of June 2001);

b is the beginning of the month occurring fourteen months before month m , unless the supplier had not gone into service at that time, in which case b is the time at which that supplier went into service; and

$CEFOR_{Dg}$ is the class-equivalent EFOR_D calculated by the ISO for suppliers of the same class as supplier g .

The definitions for equations (3) and (4) require similar modifications, so that they define f_{fgbe} and f_{pgbe} .

$DMNC_{gm}$ is the DMNC rating for Resource g which is applicable for month m , which shall be the most recent Summer DMNC rating for that supplier calculated in advance with ISO procedures if month m is part of a Summer Capability Period, or the most recent Winter DMNC rating for that supplier calculated in accordance with ISO procedures if month m is part of a Winter Capability Period.

3.2 UCAP based on equivalent GADS Data (capacity factor method)

A rolling, cumulative twelve-month, outage factor (OF) will be calculated for each Resource that submits the basic data (equivalent GADS Data) using the GADS Data form in Attachment K. The OF for month (m) will be based on GADS Date for months, $m-14$, through month, $m-3$. (For example, $EFOR_D$ for August will be based on data submitted for June of the prior year through May of the current year).

$$OF_{gm} = \frac{IST_{ge}}{12} \times (1 - CF_{gbe}) + \left(1 - \frac{IST_{ge}}{12}\right) CEFOR_{Dg}$$

where:

OF_{gm} is the Outage Factor for Resource g that will be used to determine the amount of unforced capacity that Resource will be permitted to provide in month m .

IST_{ge} is the number of months that Resource g had been in service as of time e (0 if generator g was not in service as of time e ; 12 if Resource g was in service from months $m-14$ through month $m-3$).

$$CF_{gbe} = 1 - \frac{(NAG_{gbe})}{(NDC_{gbe} \times (FOH_{gbe} + AH_{gbe}))}$$

Capacity Factor, Net Dependable Capacity, Forced Outage Hours and Available Hours for Resource g for the period beginning at month b and ending at month e . (Note: May need to consider which value of NDC to use here.)

$$UCAP_{gm} = (1 - OF_{gm}) DMNC_{gm}$$