2nd Draft

ADJUSTING FOR THE OVERSTATEMENT OF THE AVAILABILITY OF COMBUSTION TURBINE CAPACITY IN RESOURCE ADEQUACY STUDIES

FOR THE NEW YORK CONTROL AREA
During the 2008 – 2009 Capability Year
10/22/2007

For Discussion Purposes Only

Adjusting for the Overstatement of the Availability of Combustion Turbine Capacity in Resource Adequacy Studies

Introduction

In addition to the operation of the wholesale electricity market for the New York Control Area (NYCA), the other primary mission of the New York Independent System Operator (NYISO) is to ensure the reliable operation of the NYCA. This mission is accomplished by complying with and enforcing the reliability rules for planning and operating the New York State power system. The New York State Reliability Council (NYSRC) is the primary entity in New York State for establishing reliability rules and monitoring overall compliance with the rules. Annually, the NYSRC with support from the NYISO establishes the statewide Installed Capacity Requirement (ICR). This requirement is established as required by Rule A-R1 "Statewide Installed Reserve Margin Requirement". The calculation of this requirement is critical to ensuring that sufficient resources are available to the NYCA such that the probability of involuntarily disconnecting load due to the lack of available resources is on average no greater than once in ten years.

During the process of developing the database for the 2008-2009 ICR study, the NYISO conducted a review of the combustion turbine temperature derate model that is currently being utilized in the ICR study. That review indicated that there is bias between a combustion turbine's dependable maximum net capability (DMNC) and its operating point across all temperature ranges even when accounting for the expected temperature derate. The conclusion of this analysis is that the current derate model does not properly account for this bias.

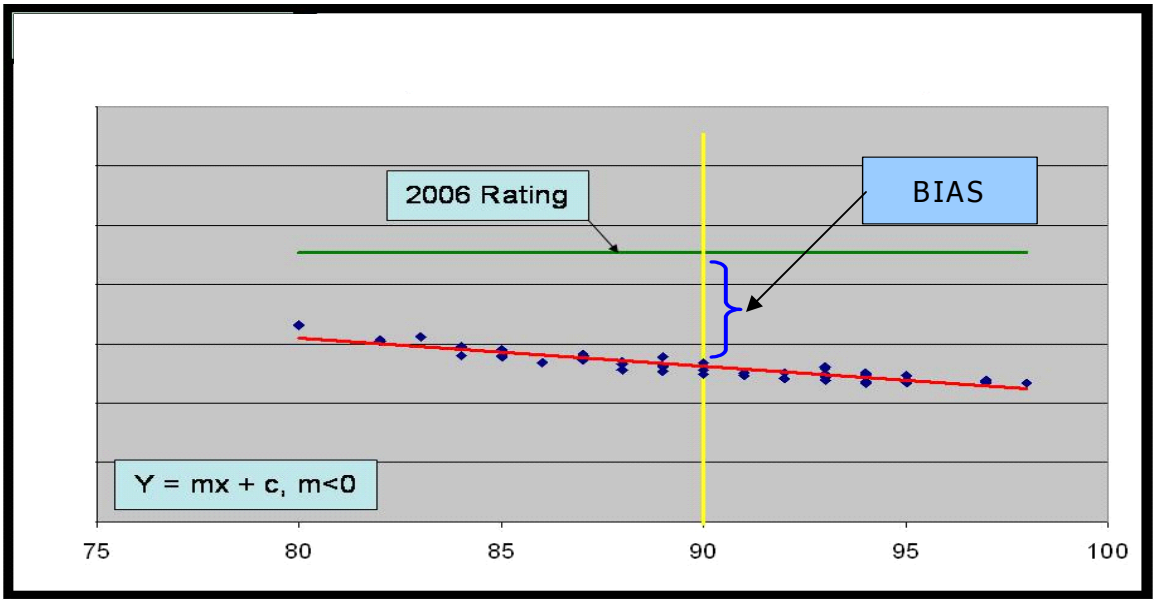
Background

The NYISO has had ongoing concerns about the availability of units during critical peak load conditions. This concern is driven by the fact that there are approximately 75 units that are allowed under the rules to schedule themselves day-ahead to their upper operating limit normal (UOLn) and are only ordered to their upper operating limit emergency (UOLe) at the request of NYISO system operations. These units are designated as capacity limited resources (CLR) and the protocol that governs their operation is spelled out in attachment M of the NYISO Installed Capacity Manual. which is attached herewith. In general, the UOLe will be the CLR DMNC value while the UOLn is some value below that.

Analysis

The NYISO has conducted analysis of operating data for combustion turbines from the summer of 2006 and 2007. Chart I below presents the general finding for 2006 of the expected performance of combustion turbines versus temperature based on actual performance. Also included in the chart is the 2006 DMNC rating (green or flat line) and the difference between the generator performance and its DMNC value defined as and identified as the bias. It should be noted that the slope of the line is consistent with existing derate model except for the bias. The information is presented as generic data because of the confidential nature of individual generator data.

Chart 1: Combustion Turbine Output Vs Temperature



The next two charts (Charts II and Chart III) present what the combustion derate model currently utilized in MARS would generate as a unit derate by temperature and load level for Zone J and Zone K.

Chart II: MARS Combustion Derate by Load Level for Zone J

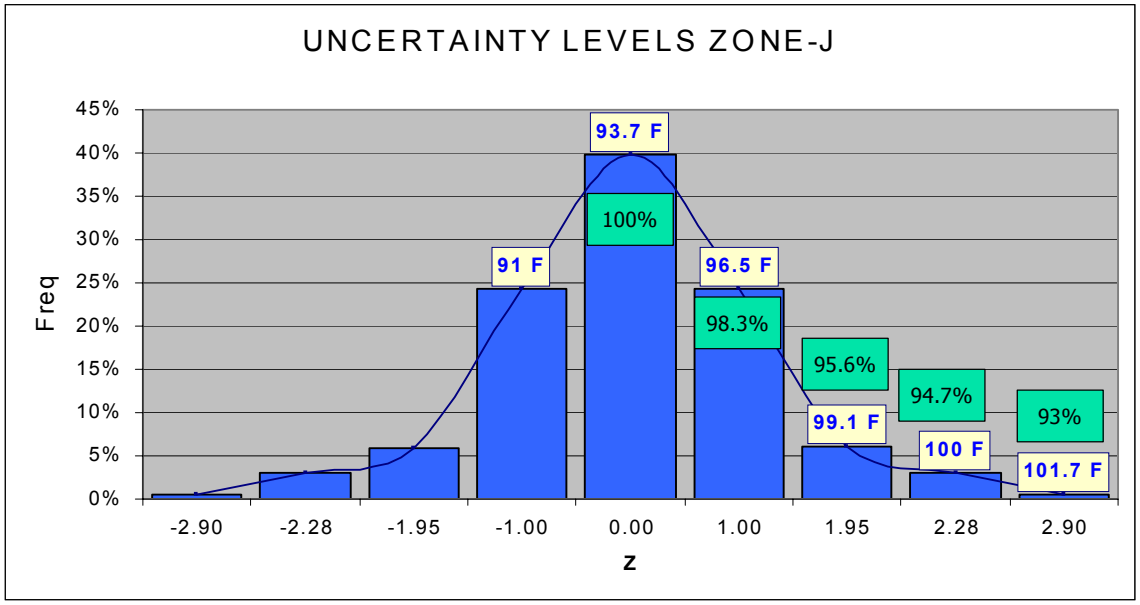
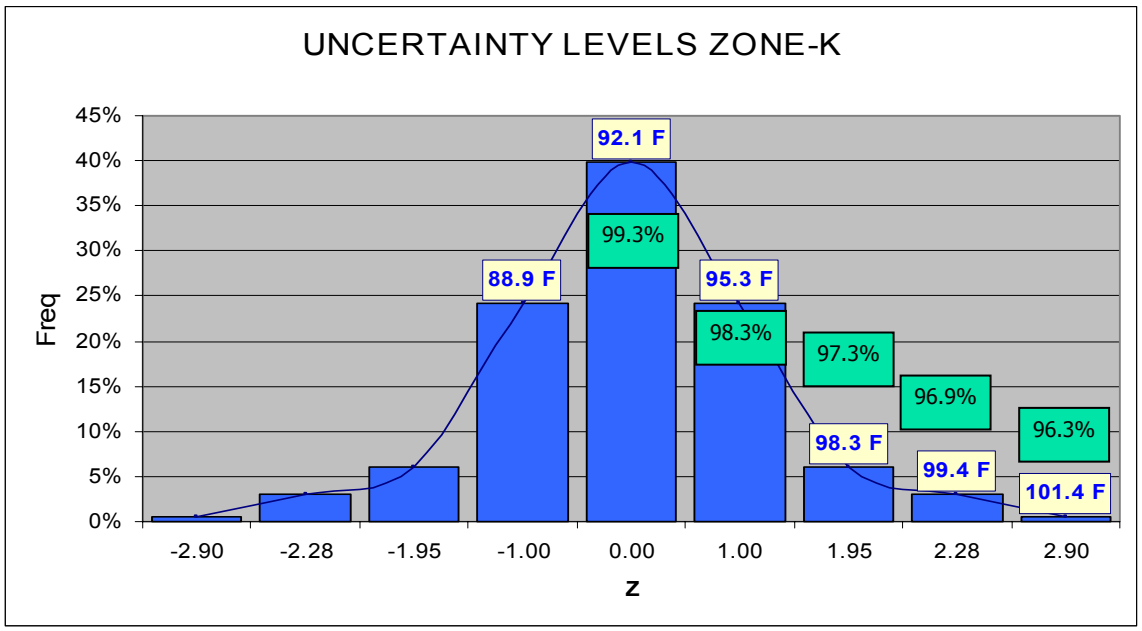


Chart III: MARS Combustion Derate by Load Level for Zone K



Charts II and III show that the current MARS derate model produces a derate that ranges at the one in two design condition up to the maximum load bin of 0% to 7% for Zone J and from 0.7% to 3.7% for Zone K. The next two Charts (Charts IV and V) present what the derate would be if the model includes what is defined as the bias which is the difference between where the unit is operating (UOLn) and the DMNC value (UOLe).

Chart IV: MARS Combustion Derate by Load Level for Zone J with Bias

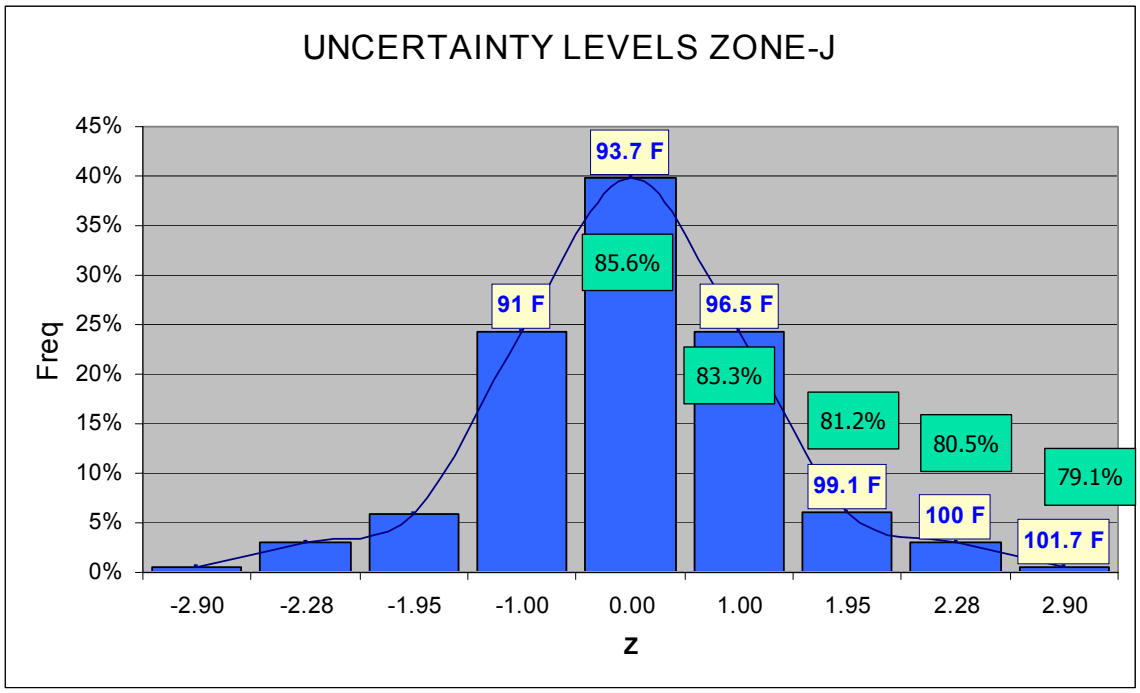
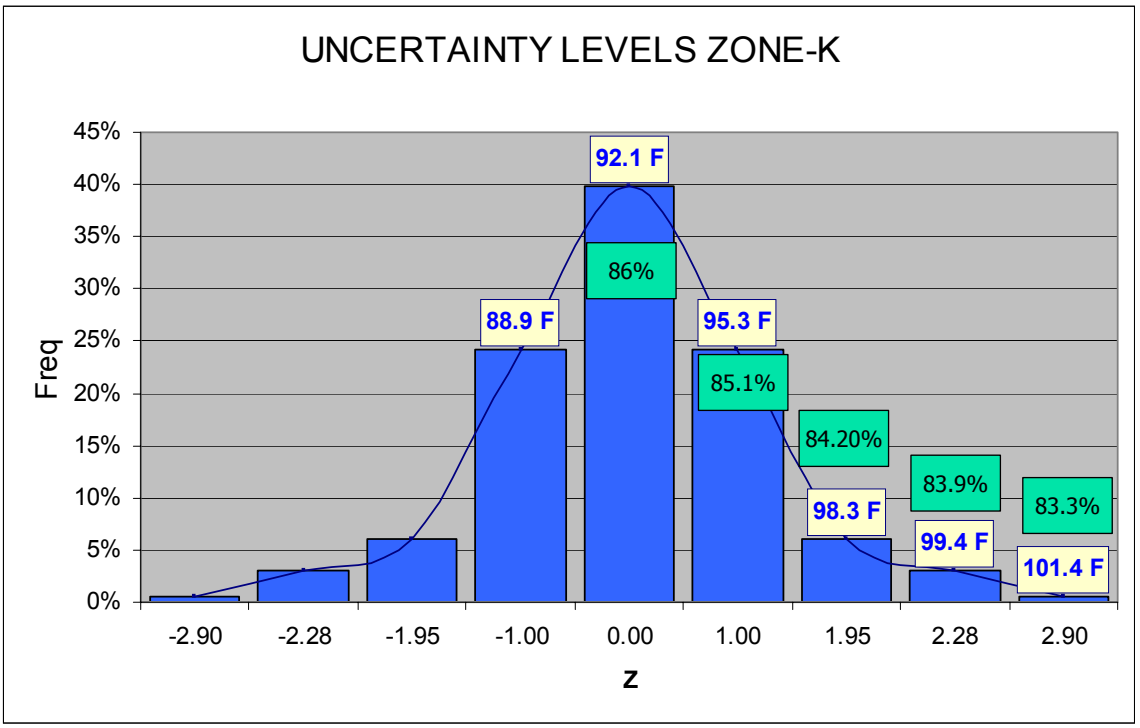


Chart V: MARS Combustion Derate by Load Level for Zone K with Bias



If the bias is included in the derate model, the combustion turbine derate for Zone J would range from 14.4% to 20.9% and for Zone K from 14% to 16.4%.

However, as explained in attachment M of the ICAP manual, CLRs are only required to operate above UOLn and up to their UOLe when requested by the NYISO system operations. This can happen by the declaration of a Major Emergency including a request for generator to go max gen. Another procedure for scheduling units above UOLn is for NYISO system operation to direct Real Time Dispatch (RTD) to use UOLe to solve security constraints and satisfy load. This can be done when system conditions warrant such as a shortage of reserve. This allows RTD to schedule units above UOLn but not necessarily all the way to UOLe. It will use only what it needs to solve. The units are sent their new schedules via "base points".

It turns out, that on August 8, 2007 which was the 2007 system peak load day, NYISO system operations directed RTD to use UOLe to solve because of exiting system condition. This directive was in effect from approximately 3:45 PM until approximately 4:45 PM. After RTD was directed to use the higher limits, the system Area Control Error

(ACE) continued to drag by more than 150 MW. As a result, the operators initiated a purchase of 200 MW of emergency assistance from external Control Areas. Weather conditions were slightly below design and therefore the system state from a load perspective was somewhere between Z = 0 and Z = -1. Therefore, UOLe should have been equivalent to the unit's DMNC value for the combustion turbines at conditions slightly below design. However, the units will only be scheduled to a level RTD needs to solve its security constraints and satisfy load.

Five minute data was evaluated to determine how well the combustion turbines responded to the new schedules. The NYISO has observed from the review of operating data that there is generally a bandwidth of + or – 3% around the base point within which units operate. Thus, units who were more than 3% below their new schedule or did not respond at all were considered to be non-responding or non-performing units. These units were evaluated as a proxy for what the expected bias would be under real-time operations. Only operating units were included. Approximately ten percent of the combustion turbine fleet was not operating at that time with about 2/3 of that scheduled as "non-sync" reserve. Review of non-performing or non-responding combustion units on that day resulted in an observed bias of 4.55% in Zones J and K versus the observed difference of approximately 14% between UOLn and DMNC. This is the value that is being utilized as the bias in modeling the combustion turbine derates in the IRM study.

Conclusion

Based on the review of 2006 and 2007 data, the NYISO has updated the derate model to include what is defined as the bias. Further, the NYISO plans to extend this analysis to other CLRs that are not combustion turbines during the next study cycle. Although this analysis indicates a bias at design temperatures, it also shows an approximate 1/3rd reduction from last year, in the amount of correction occurring at the higher temperatures. The net effect of replacing last year's combustion turbine derate with this years is a slight reduction in LOLE[1].

[1] The LOLE at the 16%/80%/99% (NYCA/NYC/LI) reserves margins for this year's final case was 0.044 days/year. When last year's derate was substituted back in, the LOLE went up to 0.049 days/year.