



PJM CETO REPORT

OCTOBER 2009

Overview

A fundamental assumption of the PJM Reserve Requirement Study is the absence of any transmission constraints within PJM that could result in isolated load pockets or “bottled” generation. This assumption is tested in part by Load Deliverability Analysis based on the Capacity Emergency Transfer Objective (CETO) and Capacity Emergency Transfer Limit (CETL) tests. These tests are applied to electrical areas (called Locational Deliverability Areas or LDAs in the RPM process) within the PJM RTO to ensure that the needed capacity resources are deliverable to load. LDAs include transmission owner zones, sub-zones and combinations of zones. The 23 PJM LDAs are defined in Schedule 10.1 of the PJM Reliability Assurance Agreement.

The CETO is defined to be the import capability required by an LDA to comply with a Transmission Risk LOLE of one event in 25 Years. The CETL is defined to be the actual emergency import capability of the test area. The CETO is driven largely by the level of generation reserves within the test area. An area passes the deliverability test if its CETL is equal to or greater than its CETO.

A detailed description of modeling for these tests is contained in Manual 20: PJM Resource Adequacy Analysis and Attachment C of Manual 14B: PJM Region Transmission Planning Process. Further discussion is included in Appendix H of the 2008 PJM Reserve Requirement Study available at <http://www.pjm.com/planning/resource-adequacy-planning/~//media/documents/reports/20081015-item-04-2008-pjm-reserve-requirement-study.ashx>.

The reliability criterion established for CETO analysis is a transmission-related Loss of Load Expectation (LOLE) of one event in 25 years. This risk refers to the probability of having to shed load due solely to insufficient transmission import capability, not a shortage of generation resources. The LOLE criterion related to generation adequacy is one day in ten years.

Load Deliverability Method

The approved CETO procedure is referred to in the Load Deliverability Method of PJM Manual 14B. In this method, only the study area is modeled. The CETO for each area in the PJM RTO is determined separately. The computer models are based on the latest load and capacity data available at the time of the study. All of the load and capacity electrically within the study area is modeled. The physical nature inherent in operating the bulk electric grid is considered in the Load Deliverability Method modeling. The LOLE tool used to conduct CETO analyses is the PRISM application.

The table below lists the most recent CETO values for each of the 23 PJM LDAs over the 2010 - 2014 planning period. It also lists if each CETO was determined as part of the RTEP process or the RPM process. The CETO assumptions and procedures are identical for both processes.

CETO Values in MW (2010 - 2014)

Study	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Load Forecast	RPM	RPM	RPM	RTEP	RTEP
IRM Study	2007	2008	2009	2008	2009
Study Date	2007	2007	2008	2007	2008
	Oct 2007	Feb 2008	Jan 2009	Feb 2008	May 2009
AE	1930	1920	1850	2140	2060
AEP	*	*	*	*	*
APS	*	*	890	60	1170
BGE	5060	4950	4480	5170	4780
ComEd	2910	3520	3580	4790	5060
Day	860	810	820	890	920
DLCO	1070	1050	960	1110	1040
DOM VP	2030	1980	1570	2890	2600
DPL	1350	1610	1360	1800	1610
DPLS	1430	1710	1520	1740	1640
JCPL	4230	4400	4350	4720	4640
MetEd	630	660	620	740	720
PECO	2390	2410	2020	2760	2240
PEPCO	3540	3500	3770	4300	3960
PLGRP	1050	1090	670	1270	880
PN	680	620	510	670	600
PS	5640	6050	6290	6440	6500
PSN	2430	2880	2720	2790	2840
Global Areas					
SWMAAC	6480	6270	5990	7320	6540
Western MAAC	*	*	*	*	*
Eastern MAAC	7740	8070	7440	9610	8950
MAAC	6670	6890	5600	9970	8190
PJM West	*	*	*	*	700

* (Asterisk) - LDA has adequate internal resources to satisfy reliability criterion

All interconnection queue projects with an executed Interconnection Service Agreement as of the Study Date are included in the model.

Capacity model is based on announced generator retirement/deactivation plans as of the Study Date.

Capacity model includes energy-only units and known behind-the-meter generators. Study load is based on the restricted load forecast adjusted by load associated with behind-the-meter generation. Restricted load is unrestricted load less load management.

The reference to the IRM Study indicates the vintage of the generator performance data used in the CETO Study. The 2010, 2011 and 2013 CETO studies used generator performance data from the 2002-2006 period and the 2012 and 2014 CETO studies used generator performance data from the 2003-2007 period.

Load allocations to DPL South and PS North are based on load flow cases provided by the respective transmission owners.

Modeling Specifics

The specific modeling details and CETO procedures are coordinated with the PJM Reserve Requirement studies and reviewed by the Planning Committee. Capacity Emergency Transfer Objective (CETO) modeling includes the following list of guidelines:

- (1) The CETO is the import capability required for the study area to meet a risk level of one event, on average, in 25 years. This risk specifically refers to the probability of an LDA shedding load due solely to its inability to import needed capacity assistance.
- (2) The PJM reliability program PRISM is used. Only a single area, the study area, is modeled.
- (3) Both Zonal and Global models are used depending on the LDA. A Zonal model excludes generating units directly connected to the 500 kV system and is used if the LDA is a zone or part of a zone. A Global model includes all connected units and is used if the LDA consists of more than one zone.
- (4) The most recent PJM Load Forecast Report is used for modeling loads.
- (5) The study area's load is based on its unrestricted peak load forecast (non-coincident peak) adjusted for forecasted load management and behind-the-meter load.
- (6) Generator performance data is consistent with that used in the most recent annual reserve requirement study and the CETL analysis.
- (7) Monthly load profile values and unit capacity factors are inputted and verified to capture the difference between winter and summer values.
- (8) Summer planned generator maintenance is not permitted.
- (9) See the PJM paper on PJM Generation Adequacy Analysis: Technical Methods, and the Reserve requirement study posted at the Planning Committee portion of the PJM web site. Further information is documented per the Application for Reliability Calculation's technical documentation and is available upon request.
- (10) Generator retirements are consistent with those posted on the PJM web site at: <http://www.pjm.com/planning/project-queues/gen-retire.html>.

- (11) A unit with a Reliability Must Run (RMR) contract for part of or for the entire Delivery Year is modeled consistent with the RTEPP. [Note: Per RPM business rules, an RMR unit with a partial year contract must offer into the auction at its Avoidable Cost. If it clears, it should be kept in service for the entire year.] A unit scheduled to be retired with no RMR contract is not modeled.
- (12) A planned generation resource addition or planned increase in rating that has executed an Interconnection Service Agreement (ISA) is modeled.
- (13) A unit that was previously mothballed but committed to serve RPM or FRR load at the time of the study is modeled.