



April 8, 2010

**PLANNING COMMITTEE**

Dear Committee Members:

**2010 PJM RESERVE REQUIREMENT STUDY - DETERMINATION OF THE PJM  
INSTALLED RESERVE MARGIN, FORECAST POOL REQUIREMENT AND DEMAND  
RESOURCE FACTOR FOR FUTURE DELIVERY YEARS**

Attached for your review and endorsement is the timetable, study assumptions, and modeling assumptions for the 2010 PJM Reserve Requirement Study (RRS). The study will examine the period beginning June 1, 2010 through May 31, 2021.

This study is conducted consistent with the provisions of the Reliability Assurance Agreement among Load Serving Entities in the PJM Region. In accordance with Reliability Pricing Model (RPM) requirements, the results of this study will be used to determine the Forecast Pool Requirement (FPR) and Demand Resource (DR) Factor for the 2014/15 Delivery Year, and for any other applicable Delivery Years, by February 1, 2011.

Specific items to note for the 2010 RRS include:

1. As specified in Schedule 4 of the Reliability Assurance Agreement, the Capacity Benefit Margin (CBM) modeled in this study will be 3500 MW. The CBM models the reliability benefit of emergency energy sales into PJM.
2. A Load Forecast Error Factor (FEF) of 1.0% will be modeled in all study years.
3. The load models for PJM and the World region will be based on assessment work performed by PJM staff and reviewed by the RRAWG. The assessment work will use the load model selection methodology endorsed by the Planning Committee at their July 15, 2009 meeting. The Planning Committee will be asked to endorse the load model selection no later than July, 2010.
4. As endorsed by the Planning Committee during the 2009 RRS, the World region will consist of the four external systems with direct ties to PJM (New York ISO, the RFC portion of MISO, TVA and VACAR) and ISO New England which has historically provided emergency assistance to PJM. Each of these five World sub-regions will be modeled at its required or target reserve margin.
5. The RRAWG is investigating the general issue of generator performance over peak demand periods and may make a recommendation on this matter to the Planning Committee for their endorsement and use in the study.

6. The capacity model will reflect operating experience related to a reduction of generating capability due to extreme ambient weather conditions. The MW amount of this reduction is being investigated by the RRAWG and a recommendation on this matter will be forwarded to the Planning Committee for their endorsement.
7. For this study, a web interface will be available for the submission of generator unit model data, per Section 2 of Manual 20. PJM Member representatives that own generation must perform this data review. This effort is targeted for May of 2010.
8. A summary timeline of the RRS process is shown in Attachment IV.
9. Flexibility to allow for additional case development and analysis is requested for this study.

In communicating the study results, it is important to focus on the Forecast Pool Requirement which is used to determine capacity obligations.

Please review these study assumptions for discussion at the April 14<sup>th</sup> and endorsement at the May 12<sup>th</sup> 2010 Planning Committee meetings.

Sincerely,

*Thomas A. Falin*

Thomas A. Falin  
Manager, Resource Adequacy Planning Department

TAF:  
Attachments

cc: w/attachments:  
Reserve Requirement Assumptions Working Group (via e-mail only)  
Resource Adequacy Planning Department

## 2010 PJM RESERVE REQUIREMENT STUDY (RRS)

### **Summary of Annual Study Procedure**

The primary focus of the PJM Reserve Requirement Study (RRS) is an analysis to determine the installed reserves required by the PJM RTO to satisfy the criterion specified in the Reliability Principles and Standards as defined in the PJM Reliability Assurance Agreement (RAA). This Study, in conjunction with PJM's Load Deliverability Test, satisfies the requirements of RFC Standard BAL-502-RFC-02. The PJM Planning Committee (PC) has the primary responsibility to coordinate and complete activities to adhere to the requirements of the RAA. The Reserve Requirement Assumptions Working group (RRAWG), established by the PC, has the responsibility to determine the proper assumptions used in this analysis and to review the final results.

The timetable shown in Attachment I illustrates the sequence of activities in this process. To accomplish this task, subcommittees and working groups reporting to the PC have been assigned the responsibilities shown in Attachment I.

The member representatives that own generation calculate and maintain information on individual generating units and operating statistics. These individual unit statistics must be submitted via a secure PJM Internet application designed for this purpose.

The Load Analysis Subcommittee (LAS) reviews the PJM Staff's efforts to calculate and maintain load forecasting values and associated probability of occurrence statistics. The PJM staff uses the information supplied from the Generation Owners, LAS, EIA-411 Report, NERC Electric Supply and Demand (ES&D) database, and the historic hourly peak loads to produce a probabilistic PJM system model. This model is used to determine the reserve requirement necessary to meet the RFC criterion for resource adequacy of a Loss of Load Expectation (LOLE) of one occurrence in ten years.

The initial task of the RRAWG in this process is to develop the study and modeling assumptions and to seek approval of these assumptions from the PC.

# ATTACHMENT I

## SCHEDULED TARGET DATES FOR THE 2010 PJM RRS

**Attachment IV  
Corresponding  
Timeline  
Number**

		<b>Responsible</b>
		<b>Target Date</b> <b>Group</b>
<b>1</b>	<b>Capacity Data Model Development</b>	
	a) Begin update of capacity model.	Jan. 1, 2010      PJM Staff
	b) Submit updated outage rate data to PJM Staff.	Jan. 20, 2010      Generator Owner Reps
<b>1</b>	<b>Load Data Model Development</b>	
	a) Submit PJM Staff forecast to PC	January 2010      PJM Staff
	b) Begin updating PJM load model.	Jan. 31, 2010      PJM Staff
<b>7</b>	<b>Capacity Models Finalized</b>	
	a) Submit final GORP outage rate data to PJM Staff.	May 15, 2010      Generator Owner Reps
	b) Load & capacity models not changed after this date. Confirm that capacity and PJM reserves correspond to latest available information.	May 28, 2010      PJM Staff
<b>8</b>	<b>FPR, IRM &amp; DR Factor Analysis</b> PJM RTO region	July 2, 2010      PJM Staff
<b>9</b>	<b>Approval of Load Model Time Period</b> RRAWG Recommendation.	July 14, 2010      PC
<b>8</b>	<b>Analysis of Winter Weekly Reserve Target for 2010-2011 Winter Period</b> PJM RTO region.	July 31, 2010      PJM Staff
<b>13</b>	<b>Report on Winter Weekly Reserve Target for 2010-2011 Winter Period</b> This is based on the approved 2010 PJM RTO Region Reserve Study results.	September      RRAWG
	a) Forward letter to OC with recommended Winter Weekly Reserve Target.	Sept PC Mtg.      PC
<b>13</b>	<b>Distribute Final Report to PC</b> Final Draft Final ReportOct PC Mtg.	Sept PC Mtg.      RRAWG RRAWG
<b>14A</b>	<b>Endorsement / Recommendation of applicable Factors (IRM, FPR, DR Factor)</b>	Oct PC Mtg.      PC

## ATTACHMENT II

### STUDY ASSUMPTIONS FOR THE 2010 PJM RRS

1. The 2010 RRS will be conducted as outlined in the “PJM Generation Adequacy Analysis: Technical Methods,” dated October 2003 (<http://www.pjm.com/planning/resource-adequacy-planning/~media/planning/res-adeq/20040621-white-paper-sections12.ashx> ) and PJM Manual M20 revision 3, “PJM Resource Adequacy Analysis,” dated June 1, 2007.
2. The PJM Installed Reserve Margin (IRM) will be determined using PJM’s two-area model, the Probabilistic Reliability Index Study Model (PRISM). The analyses will focus on results for Area 1, the PJM RTO representation. The Area 2 model represents the electrically significant regions adjacent to the PJM RTO as described in Item 8. The modeling details of performing a two-area study are described in Attachment III. The Demand Response (DR) Factor will be based on a PJM RTO single-area model as was done in previous studies. MARS will be used to supplement the PRISM study results, specifically concerning issues that require multi-area modeling techniques.
3. The PJM RTO footprint will be modeled as Area 1 in the study. Area 1 load will consist of the combined coincident loads of the following regions: PJM Mid-Atlantic + APS + AEP + ComEd + Dayton + DomVP + DLCO + ATSI. A sensitivity case will be run with ATSI in the World area.
4. All generators will be modeled as capacity units per the modeling assumptions in Attachment III. A wind generator’s modeled capacity, in megawatts, is based on either actual unit performance data or the class average value of 13% of the name plate rating if insufficient actual unit performance data is available.
5. Planned outages of generating units will be represented throughout the summer period. This is done to reflect operating experience related to a reduction of generating capability due to extreme ambient temperatures that would not be captured otherwise. The MW amount of these outages is being investigated by the RRAWG and a recommendation will be forwarded to the Planning Committee. In addition, the RRAWG is investigating the overall performance of generation over peak demand periods and may make a recommendation regarding this matter to the Planning Committee.
6. The reserve requirement base reserve level for the DR Factor calculations will be 15.3%. The DR Factor may be recalculated if the PJM Board of Managers approves an installed reserve margin other than 15.3% for the 2014/2015 delivery year.
7. The Capacity Benefit Margin (CBM) modeled in this study will be varied between zero and saturation. All reserve requirement values shown in the analysis results summary will assume a CBM of 3500 MW.

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<sup>1</sup> PJM Mid-Atlantic includes: Atlantic City Electric; Baltimore Gas & Electric Co.; Delmarva Power; Jersey Central Power & Light Co. (JCP&L); Metropolitan Edison Co. (Met-Ed); PECO, an Exelon Company; Pepco; Pennsylvania Electric Co. (Penelec); PPL Electric Utilities; PSE&G; and UGI Utilities, Inc.; APS = Allegheny Power System; AEP = American Electric Power; ComEd = Commonwealth Edison; Dayton = Dayton Power & Light; DomVP = Dominion Virginia Power; DLCO = Duquesne Light Co. ATSI = American Transmission Systems, Inc.

8. World reserves will be modeled at the individual World sub-regions “one day in ten year” reserve levels. The World sub-regions shall be:
  - New York Independent System Operator (NYISO)
  - Independent System Operator of New England (ISO-NE)
  - Tennessee Valley Authority (TVA)
  - Virginia–Carolinas (VACAR)
  - ReliabilityFirst Corporation (RFC) portion of the Midwest Independent System Operator (MISO)
9. Behind the meter generation (BTMG) modeling: Per the June 28, 2004 PC meeting, BTMG may be treated as either a capacity resource or may be used to reduce the 5 CP (coincident peak) load. The choice of the modeling method is left to the owner of the BTMG resource.
10. The Forecast Error Factor (FEF) will be held at 1 percent for all planning periods being evaluated. This practice is consistent with consensus gained through the PJM stakeholder process.

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## ATTACHMENT III

### MODELING ASSUMPTIONS FOR THE 2010 PJM RRS

#### 1. Load Models

Both PJM and the World load models will be selected based on the methodology approved by the Planning Committee at their July 15, 2009 meeting.

#### 2. PJM RTO Capacity Model

The generating units within the PJM RTO Study region will use statistics as detailed in the PJM Manual M22 revision 15, "Generator Resource Performance Indices," dated June 1, 2007. The statistics used are: Equivalent Demand Forced Outage Rate (EFORd), Effective EFORd (EEFORd), Capacity Variance, and Planned Outage Factor (POF).

The data for these statistics is primarily provided through PJM's electronic Generation Availability Data System (eGADS) web interface, per PJM manual M23 revision 4, dated June 1, 2007. A five year time period (2005-2009) is used for the calculation of these statistics. These statistics are compared, for consistency, to those calculated and shown in the NERC Brochure dated 8/25/2009 for units reporting events (2004-2008) <http://www.nerc.com/page.php?cid=4|43|47>. The Generation Owners of the various individual units are required to review and provide changes via a secure web interface that is part of the PJM web site (<https://esuitem.com/Rstudy/>).

#### 3. World Capacity Model

The 2009 NERC Electricity Supply & Demand (ES&D) will be the basis for future World generating unit information. Future capacity plans for World areas will be obtained from neighboring NERC regions. All World unit EEFORd and maintenance cycles will be updated using the latest Class Average Outage Rates. These rates, obtained from the NERC's pc-based Generation Availability Report (pc-GAR) application or applicable PJM eGADS summaries, will be based on a five year period.

#### 4. Planning and Operating Treatment of Generation

All generators that have been demonstrated to be deliverable will be modeled as PJM capacity resources in the PJM study area. External capacity resources will be modeled as internal to PJM if they meet the following requirements:

1. Firm Transmission service to the PJM border
2. Firm ATC reservation into PJM
3. Letter of non-recallability from the native control zone

**Assuming that these requirements are fully satisfied, the following comments apply:**

- Only PJM's "owned" share of generation will be modeled in PJM. Any generation located within PJM that serves World load with a firm commitment will be modeled in the World.
- Firm capacity purchases will be modeled as generation located within PJM. Firm capacity sales will be modeled by decreasing PJM generation by the full amount of the sale.

- Non-firm sales and purchases will not be modeled. The general rule is that any generation that is recallable by another control area does not qualify as PJM capacity and therefore will not be modeled in the PJM Area.
- Active generation projects in the PJM interconnection queues will be modeled in the PJM RTO after applying a suitable commercial probability.

#### **5. Reserve levels in the World region**

Reserve levels in the World sub-regions will be based on each region's required or target reserve margin to satisfy a one day in ten year LOLE. The modeling of these reserves will reflect intra-World load diversity.

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## ATTACHMENT IV

### Time Line for 2010 Reserve Requirement Study

**Annual Reserve Requirement Study (RRS) Timeline** - Milestones (Green) and Deliverables (Blue)  
Reserve Requirement Assumptions Working Group (RRAWG) related activities

Description	January	February	March	April	May	June	July	August	September	October	November	December	January	February
1 Data Modeling efforts by PJM Staff														
2 Produce draft assumptions for RRS														
3 RRAWG comments on draft assumptions														
4 <b>RRAWG &amp; PJM Staff finalize Assumptions</b>														
5 PC receive update and final Assumptions. Review/discuss/provide feedback														
6 <b>PC establish / endorse Study assumptions</b>														
7 Generation Owners review Capacity model														
8 PJM Staff performs assessment/analysis														
9 <b>PC establish hourly load time period</b>														
10 Status update to RRAWG by PJM staff														
11 PJM Staff produces draft report														
12 Draft Report, review by RRAWG														
13 <b>RRAWG finalize report, distribute to PC. Winter Weekly Reserve Target Recommendation</b>														
14 Stakeholder Process for review, discussion, endorsement of Study results (PC, MRC,MC).														
14 A Planning Committee Review & Recommendation														
14 B Markets and Reliability Committee Review & Recommendation														
14 C Members Committee Review & Recommendation														
15 PJM Board of Managers approve IRM, FPR, DR Factors														
16 Posting of Final Values for RPM BRA - FPR & DR factors for 3 year forward Delivery year														

The 2010 Study activities last for approximately 14 months. Some current Study activities, shown in items 1 and 2, overlap the previous Study timeframe. The posting of final values occurs on or about February 1<sup>st</sup>.