

Appendix A Base Case Modeling Assumptions for 2010 PJM RRS

Parameter	2009 Study Modeling Assumptions	Recommended 2010 Study Modeling Assumptions xxxxx letter to PC Approved at xxxxx PC mtg.	Basis for Recommended Assumptions	Possible Impact on IRM
Load Forecast				
Unrestricted Peak Load Forecast	160,756 MW (2013/2014 DY)	163,093 MW (2014/15 DY)	Forecasted Load growth per 2010 PJM Load Forecast Report, using 50/50 normalized peak.	
Historical Basis for Load Model	1997 - 2006	TBD	Will use the load model selection method approved at the July 15, 2009 PC meeting.	
Forecast Error Factor (FEF)	Forecast Error held at 1 % for all delivery years.	Forecast Error held at 1 % for all delivery years.	Consistent with consensus gained through PJM stakeholder process.	
Monthly Load Forecast Shape	Consistent with 2009 PJM Load Forecast Report and 2008 NERC ES&D report (World area).	Consistent with 2010 PJM Load Forecast Report and 2009 NERC ES&D report (World area).	Updated data.	
Daily Load Forecast Shape	Standard Normal distribution and Expected Weekly Maximum (EWM) based on 5 daily peaks in week.	Standard Normal distribution and Expected Weekly Maximum (EWM) based on 5 daily peaks in week.	Consistent with consensus gained through PJM stakeholder process.	
Capacity Forecast				
Generating Unit Capacities	Coordinated with eRPM databases, EIA-411 submission, and Generation Owner review.	Coordinated with eRPM databases, EIA-411 submission, and Generation Owner review.	New RPM Market structure required coordination to new database Schema. Consistency with other PJM reporting and systems.	
New Units	Generation Interconnection Queues coordinated with September 2009 version of forecast reserve margin graph which uses commercial probability. See http://www.pjm.com/planning/resource-adequacy-planning/resource-reports-info.aspx .	Generation Interconnection Queues coordinated with xxxxxxxx 2010 version of forecast reserve margin graph which uses commercial probability. See http://www.pjm.com/planning/resource-adequacy-planning/resource-reports-info.aspx .	Requirement using commercial probability for planned projects.	
Wind Resources	Derived from hourly wind data over summer peak hours. Units can use a capacity factor of 13% or actual performance once historic data is available.	Derived from hourly wind data over summer peak hours. Units can use a capacity factor of 13% or actual performance once historic data is available.	Based on Manual 21 Appendix B for Intermittent Capacity Resources. 13% capacity factor based on PJM stakeholder process, February 22, 2008 Planning Committee, Agenda Item 9.	

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Firm Purchases and Sales	Firm purchase and sales from and to external regions are reflected in the capacity model. External purchases reduce the World capacity and increase the PJM RTO capacity. External Sales reduce the PJM RTO capacity and increase the World capacity. This is consistent with EIA-411 Schedule 4 and reflected in RPM auctions.	Firm purchase and sales from and to external regions are reflected in the capacity model. External purchases reduce the World capacity and increase the PJM RTO capacity. External Sales reduce the PJM RTO capacity and increase the World capacity. This is consistent with EIA-411 Schedule 4 and reflected in RPM auctions.	Match EIA-411 submission and RPM auctions.	
Retirements	Coordinated with PJM Operations, Transmission Planning models and PJM web site: http://www.pjm.com/planning/generation-retirements.aspx . Consistent with forecast reserve margin graph.	Coordinated with PJM Operations, Transmission Planning models and PJM web site: http://www.pjm.com/planning/generation-retirements.aspx . Consistent with forecast reserve margin graph.	Updated data available on PJM's web site, but model data frozen in August 2010.	
Planned 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.	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.	Consistency with other PJM reporting and systems.	
Unit Operational Factors				
Forced and Partial Outage Rates	5-year (2004-08) GADS data. (Those units with less than five years data will use class average representative data.).	5-year (2005-09) GADS data. (Those units with less than five years data will use class average representative data.).	Most recent 5-year period. Use PJM RTO unit fleet to form class average values.	

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Planned Outages	Based on eGADS data, History of Planned Outage Factor for units.	Based on eGADS data, History of Planned Outage Factor for units.	Updated schedules.	
Summer Planned Outage Maintenance	In review of recent Summer periods, no Planned outages have occurred.	In review of recent Summer periods, no Planned outages have occurred.	Review of historic 2005, 2006, 2007, 2008 and 2009 unit operational data for PJM RTO footprint.	
Gas Turbines, Fossil, Hydro Nuclear Ambient Derate	Ambient Derate includes several categories of unit. Based on review by Operations Staff and review of operations data, Summer 2005, 2006, and 2007. 2,500 MW out on planned outage over summer peak.	TBD	Operational history and Operations Staff experience indicates unit derate during extreme ambient conditions.	
Generator Performance	Peak period generator performance is consistent with year-round generator performance	TBD		
Class Average Statistics	PJM RTO fleet Class Average values. 72 categories based on unit type, size and primary fuel.	PJM RTO fleet Class Average values. 72 categories based on unit type, size and primary fuel.	PJM RTO values have a sufficient population of data for most of the categories. The values are more consistent with planning experience.	
Uncommitted Resources	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.	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.	Consistency with other PJM reporting and systems.	
Generation Owner Review	Web Application to review and sign-off of capacity model. Performed by Generation Owner representatives.	Web Application to review and sign-off of capacity model. Performed by Generation Owner representatives.	Annual review to insure data integrity of principal modeling parameters.	
Load Management - Demand Resource (DR) and Interruptible load for Reliability (ILR)				
Demand Resources	PJM RTO load management modeled per the January 2009 PJM Load Forecast Report.	PJM RTO load management modeled per the January 2010 PJM Load Forecast Report.	Model latest load management data.	
Emergency Operating Procedures	IRM reported for Emergency Operating Procedures that include invoking load management but before invoking Voltage reductions.	IRM reported for Emergency Operating Procedures that include invoking load management but before invoking Voltage reductions.	Consistent reporting across historic values.	
Transmission System				
Interface Limits	The Capacity Benefit Margin (CBM) is input value used to reflect the amount of transmission import capability reserved to reduce the IRM. This value is 3,500 MW.	The Capacity Benefit Margin (CBM) is input value used to reflect the amount of transmission import capability reserved to reduce the IRM. This value is 3,500 MW.	Reliability Assurance Agreement, Schedule 4, Capacity Benefit Margin definition.	
New Transmission Capability	Consistent with PJM's RTEP as overseen by TEAC.	Consistent with PJM's RTEP as overseen by TEAC.	Consistent with PJM's RTEP as overseen by TEAC.	

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Modeling Systems				
Modeling Tools	PRISM Version 4.0	PRISM Version 4.0	Per recommendation by PJM Staff. Latest available version.	
Modeling Tools	WKPKFQ Version 4.0	WKPKFQ Version 4.0	Per recommendation by PJM Staff. Latest available version.	
Modeling Tools	Applications for Reliability Calculations (ARC) Version 4.0	ARC Version 4.0	Per recommendation by PJM Staff. Latest available version.	
Modeling Tools	Multi-Area Reliability Simulation (MARS) Version 3.01	Multi-Area Reliability Simulation (MARS) Version 3.01	Per recommendation by PJM Staff and General Electric Staff. Latest available version.	
Outside World Area Models	3 rd year for new NERC region boundary reporting. Updated models for RFC, MRO-USA, NPCC (Ont, NY, NE), SERC (TVA, Entergy, Southern, VACAR) adjusted to fit into the old NERC region boundary definitions. Base Case world region include: NY, NE, MISO (East & Central), TVA and VACAR.	4 th year for new NERC region boundary reporting. Updated models for RFC, MRO-USA, NPCC (Ont, NY, NE), SERC (TVA, Entergy, Southern, VACAR) adjusted to fit into the old NERC region boundary definitions. Base Case world region include: NY, NE, MISO (East & Central), TVA and VACAR.	Updated per publicly available data and by coordination with other region's planning staffs.	

Time Line for 2010 Reserve Requirement Study

Figure D - 1: Time Line for 2010 RRS

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
1 Data Modeling efforts by PJM Staff	Blue	Blue	Blue	Blue	Blue					
2 Produce draft assumptions for RRS		Blue	Blue							
3 RRAWG comments on draft assumptions			Blue	Blue						
4 RRAWG & PJM Staff finalize Assumptions				Green						
5 PC receive update and final Assumptions. Review/discuss/provide feedback			Blue	Blue						
6 PC establish / endorse Study assumptions					Green					
7 Generation Owners review Capacity model					Blue					
8 PJM Staff performs assessment/analysis					Blue	Blue	Blue			
9 PC establish hourly load time period							Green			
10 Status update to RRAWG by PJM staff							Blue			
11 PJM Staff produces draft report						Blue	Blue			
12 Draft Report, review by RRAWG								Blue	Blue	
13 RRAWG finalize report, distribute to PC. Winter Weekly Reserve Target Recommendation									Green	
14 Stakeholder Process for review, discussion, endorsement of Study results (PC, MRC,MC).										Blue
14 A Planning Committee Review & Recommendation										Blue
14 B Markets and Reliability Committee Review & Recommendation										Blue
14 C Members Committee Review & Recommendation										Blue
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 1st.