

**Load Analysis Subcommittee**  
**Teleconference / Web conference**  
**Wednesday, September 2, 2015**  
**1:30 p.m. – 4:00 p.m. EPT**

## Administration

1. Mr. Reynolds opened the meeting and reviewed the agenda. Ms. Mooney performed roll call.
2. The Load Analysis Subcommittee reviewed and approved the draft minutes from the May 27, 2015 meeting. Minutes will be posted as final.

## Load Forecast Model Development

### 3. Weather Normalization

Mr. Reynolds reviewed PJM's work on weather normalization (WN). He explained that the current method of weather normalization involved updating the peak forecast model so WN values changed when the model was updated. The new method is intended to capture the long-term trend of each zone's seasonal non-coincident peak loads and give a reasonable portrayal of anticipated first year growth. The new method regresses daily peak load on non-holiday weekdays against weather and evaluates the equation at a weather standard. This weather normalization method is applied for the summer season with a two-day weighted temperature humidity index and for the winter season with a wind-adjusted temperature weather parameter.

A number of areas were considered while developing the new weather normalization method. PJM tested using one year of historical data and three years of historical data in the estimation. The decision was to use three years of data which has the impact of smoothing the series while preserving load trends. Next, the number of years to use in the weather standard was chosen to be 1994 to the most recent year available to be consistent with the model simulation. The third area examined was which type of days to use for the weather standard. PJM chose to use the seasonal extreme from all non-holiday weekdays in order to balance between using peak day weather and the seasonal extreme weather. The chosen method would also include a static weather standard so that only load changes are reflected. It was noted that this method would restate previous weather normalized values each year. Finally, PJM chose to use an average rather than median value for the weather standard as they are not significantly different and using an average is the industry standard.

Mr. Reynolds noted that the weather normalized method applies to zonal non-coincident peaks. The development of coincident weather normalized peaks has not been addressed and may not be needed if capacity market cost allocation is revamped.

### 4. Peak Load Model Enhancements

Mr. Gledhill presented updates to PJM's proposed model revisions. He stated at the beginning of the presentation that the forecast to be presented is a Regional Transmission Expansion Plan (RTEP) load forecast and not a Reliability Pricing Model (RPM) forecast. PJM still needs to decide how to handle

Energy Efficiency so as to not double count it since it is both imbedded in the new model framework but can also be a supply resource in RPM.

The first update presented was a change in the weather history PJM uses in the forecast simulation. Currently the model is simulated with weather back to 1973. After looking at the median percentiles from the twenty six weather stations it was observed that more recent THI values are modestly higher and the 90<sup>th</sup> percentile THIs were also higher using a more recent sample. It was determined that using a shortened weather period starting in 1994/1995 would be consistent with evolving weather trends. LAS members asked about the effects of urban heat islands where temperature measured at an airport would be different than the temperature measured where load is concentrated. It was noted that if this differential is constant there would be no issue. Other LAS members were concerned that shortening the weather period would be more volatile. PJM responded that the new model is much more consistent with loads actually occurring and that the start year of 1994/1995 would not be rolled out each year just adding on an additional most recent year of weather. The number of years used would be revisited as necessary.

Next, Mr. Gledhill reviewed updates to the model which include modifications to the splines, updated economics, updated weather stations, revised cooling saturation data, and new load adjustments. At the April LAS meeting new SplineTHI and WWP variables were discussed. There were pre-processing steps that ultimately created a single spline variable. This method did not allow varying behavior at different THI (or WWP) ranges. In the most recent model update it was decided to split up with the splines so that each range is represented by an individual variable. PJM also applied zone specific THI and WWP ranges for the weather splines.

The latest model and forecast results include Moody's Analytics July 2015 economic forecast which includes a re-definition of some metropolitan areas. Mr. Gledhill also noted that the latest model uses the Virginia state economic data for the Dominion zone as the previous metropolitan grouping did not include the high growth areas of northern Virginia. There were minor changes to weather station assignments and weightings in response to information received from EDCs.

Each zone is assigned to a Census Division in order to construct their new equipment indexes. Dominion provided PJM with historical residential cooling saturation figures which PJM used in their model. Any other zone which has saturation information to share is welcome to contact PJM. Finally, PJM included load adjustment binary variables in the models for years in which a zone's base load was out of line with their economic index interacted with the other equipment index.

Mr. Gledhill shared new forecast results and growth rates for the summer and winter. The new model forecast changes were decomposed by each source of variation, with the comparison being to the 2015 load forecast model without the binary variable in 2013. For the summer, the equipment index variables lower the starting point and reduce forecasted growth. The weather re-specification and autoregressive error term lowers the starting point while the use of a shortened weather simulation period raises the starting point.

Finally, accuracy results were presented which show that as additional years of the equipment index trends are incorporated into the estimation period it becomes a better predictor of future load trends and improves accuracy. The new specification improves accuracy measured by mean absolute percent error on the 10CP days by roughly 75% on a three year out basis. Mr. Gledhill concluded the presentation by saying

that the updated model is not the 2016 official forecast. The data and model changes that will change include: economic and equipment index trend data will be updated, any additional model changes, an additional year of load data will be included in the estimation period, any changes to weather stations and any addbacks PJM reviews and deems appropriate to include. PJM will update Manual 19 with model changes and present at the PC and MRC in October or November in order to have the model endorsed and in place for the 2016 Load Forecast. There will be a September 16<sup>th</sup> LAS call and stakeholders were asked to submit requests for data and clarification to PJM prior to this call.

## 5. Distributed Generation

Ms. Cummings updated the subcommittee on efforts to incorporate the impact of distributed solar generation into the load forecast with zonal detail. Potential forecast approaches and data sources were summarized. It was noted that there is concern with using state mandates as data may not be location specific since some states do not require a resource to be physically located within state and some states do not have any solar mandates.

PJM is in talks with IHS Energy which currently does a North America Renewable Power Market Forecast. PJM is working with IHS to leverage their forecasts to assist PJM with future solar additions. Ms. Cummings plans to share more information and specifics about this potential partnership at a future LAS Meeting.

## Future Meeting Dates

September 16, 2015

1:30p.m. – 4:00 p.m.

Webex

## In Attendance

Chad Burnett	American Electric Power
Mark Harris	American Electric Power
Randy Holliday	American Electric Power
Lisa McAlister	American Municipal Power, Inc.
Chris Norton	American Municipal Power, Inc.
Michael Chechelnitzsky	ArLight Energy Marketing LLC
David Bloom	Baltimore Gas and Electric Company
John McDaniel	Baltimore Gas and Electric Company
Sara Bishop	Calpine
Dave Scarpignato	Calpine
Jakob Metzler	Castleton Commodities Merchant Trading LLC
David Apostol	Commonwealth Edison Company
Dennis Kelter	Commonwealth Edison Company
Robert Zacher	Commonwealth Edison Company
Dan Griffiths	Consumer Advocates of PJM States
Guy Filomena	Customized Energy Solutions, Ltd

Carl Johnson	Customized Energy Solutions, Ltd
Jonathan Sasser	Customized Energy Solutions, Ltd
Joe DeLosa	DE Public Service Commission
John Farber	DE Public Service Commission
Ruth Price	DE Public Service Commission
David Hastings	DhastCo, LLC
Ken Berger	Dominion Virginia Power
Billy Coyle	Dominion Virginia Power
Michael Jesensky	Dominion Virginia Power
Karim Siamer	Dominion Virginia Power
Kelly Zhang	Dominion Virginia Power
Leon Brunson	Duke Energy Ohio, Inc.
Chuck Dugan	East Kentucky Power Cooperative, Inc.
Sally Witt	East Kentucky Power Cooperative, Inc.
Malcolm Ainspan	Energy Curtailment Specialists, Inc.
MQ Riding	Essential Power OPP, LLC
Jason Barker	Exelon Business Services Company, LLC
Jim Benchek	FirstEnergy Solutions Corp.
Martin Bolan	FirstEnergy Solutions Corp.
Lou D'Alessandris	FirstEnergy Solutions Corp.
Michelle Henry	FirstEnergy Solutions Corp.
Bill Moll	FirstEnergy Solutions Corp.
Derek Hagaman	GT Power Group
Roy Shanker	H.Q. Energy Services (US), Inc
Kenneth Foladare	IMG Midstream LLC
Alan Nasr	ITC Transco
James Peters	ITC Transco
Bob O'Connell	Main Line Electricity Market Consultants
Chris Shelton	Millenium Power, Inc
Dave Mabry	McNees Wallace & Nurick LLC
Tim McClive	Navigant
James Manning	North Carolina Electric Membership Corporation
Ruth Holdbrook	Northern Virginia Electric Cooperative
Allison Clements	NRDC
John Moore	NRDC
Neal Fitch	NRG Power Marketing LLC
David Hamilton	Old Dominion Electric Cooperative
Greg Carmean	OPSI
Adam Mihalik	PPGI Fund A/B Development, LLC
Eric Matheson	Pennsylvania Public Utility Commission
Kenneth Reif	PPL Electric Utilities Corp.



# Meeting Minutes - Draft

Matt Webb  
Kenneth Carretta  
James Jablonski  
Stephen Wreschnig  
Debbie Gebolys  
Tom Hoatson  
Dean Bickerstaff  
Paul Peterson  
Kyle VanderHelm  
James Wilson

PPL Electric Utilities Corp.  
PSEG Energy Resources and Trade LLC  
Public Power Authority of New Jersey  
Public Service Electric & Gas Company  
Public Utility Commission of Ohio  
Riverside Generating, LLC  
Sapphire Power Marketing LLC  
Synapse Energy Economics, Inc.  
Tenaska Power Services Co.  
Wilson Energy Economics

## PJM Staff

John Reynolds, Chairman  
Murty Bhavaraju  
Bridgid Cummings  
Tom Falin  
Andrew Gledhill  
Jason Quevada  
Patricio Rocha-Garrido  
Molly Mooney, Secretary

PJM Interconnection, L.L.C.  
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