



Metering Task Force Final Proposal Report

July 22, 2016

Issue Summary

Meter data accuracy, reliability, and availability are foundational to almost all electric utilities. It has a wide impact to system protection, operation decisions, system reliability and markets fairness. PJM Manual 01, Section 5, is the main body of the PJM metering requirements. The metering standards and requirements in Manual 01 are due for an update to resolve long-standing clarity and readability issues to close the gap between PJM's intended meaning and member understanding and actions. Since monitoring and revenue meters are a significant capital investment for members, designing a consensus-based solution to balance the requirements and the costs is the focus of PJM Metering Task Force (MTF).

Key Issue Dates

Problem Statement Approval: September 8th, 2015 - OC

Issue Charge Approval: September 8th, 2015 - OC

Charter Approval: December 1st, 2015 - OC

[Metering Task Force Problem Statement](#)

[Metering Task Force Issue Charge](#)

[Metering Task Force Charter](#)

Stakeholder Process Summary

Stakeholder Meetings - Nine stakeholder meetings on this topic were conducted between November 13, 2015 and June 13, 2016.

Education - Due to the very complex and technical nature of the issue, the education phase was continued throughout the meetings. The MTF stakeholders engaged in 12 topics of mutual education and learning to ensure that all participants were of similar understanding on the meter related issues. PJM and stakeholder subject matter experts were engaged to help stakeholders understand, explore, and determine the best practices. The education was focused on overviews of the issue history; PJM's existing standards and requirements related to metering; the impact of metering data to PJM's operation and market; NERC and ANSI/IEEE standards related to metering; RTO/ISO peer practice; cost



and field practice regarding metering unit installation etc. PJM also conducted two surveys within the task force to collect information regarding members' current metering infrastructures and common practices.

Interest Identification, Design Components, and Solution Options – Regularly scheduled meetings were held from 12/16/2015 to 5/4/2016 focusing on interest identification, design components and package development as part of the Consensus Based Issue Resolution (CBIR) process. PJM proposed a consolidated package for stakeholder review on 5/4/2016 and was reviewed at subsequent meetings on 5/18/2016 and 6/15/2016. Based on stakeholder comments, PJM incorporated additional modifications to the consolidated package that PJM originally proposed on 5/4/2016. No other packages were proposed by MTF.

Status Reporting – Regular status reports were provided to the PJM Operating Committee (OC) and System Information Subcommittee (SIS). Formal minutes were posted to the [PJM Metering Task Force Website](#).

Polling Result - The group reached a Tier 1 Consensus Package which forms the basis of its report. A non-binding [Poll](#) was sent out requesting feedback on support for the PJM Package. PJM received a total of 54 responses all in support of the package.

1. Recommended Proposal

The recommendations are applicable to both billing meters and operational metering that communicate information to PJM. In general the requirements apply to meters that connected to PJM transmission system, not distribution system.

The recommended proposal package consisted of eleven components:

1. Metering boundary: PJM defines the metering system boundary as everything from first measurement to first digitization of the measurement, where it is expected that no further loss of accuracy will occur downstream.
2. Accuracy definition: Accuracy is expressed as a percentage to be interpreted as the maximum acceptable percent greater than or less than the true value.
3. Accuracy Calculation: Metering performance is a complex metric with many factors. Considering the variety of the infrastructure configuration of metering system, PJM requires the metering systems accuracy may be decided by one of three methodologies: calculation using nameplate accuracy, as-built calculation, or testing.
4. Measurement Category: Based upon the usage and type of the data that received from the meters or telemetries, PJM defines two major categories: Billing Meters (Accumulator data) and System Control and Monitoring Metering (Instantaneous data).
 - Billing meters often referred to as “revenue grade”, would typically provide “interval data”, and often measure energy at the Point of Interconnection (POI) between two parties. PJM utilizes data from these meters to settle transactions between market participants.
 - System Control and Monitoring (Instantaneous data): PJM dispatch utilizes data from these meters to continuously match generation with demand and to assure system security. There are six classes of



system control and monitoring data. They are: Tie-lines, area regulation, generation dispatch, generation reserve, system restoration, and general telemetry.

5. Measurement Accuracy: Accuracy is one of the fundamental requirements of metering. For each class of System Control and Monitoring data and Billing meter data, the meter accuracy and periodicity of data transmission is specified.

6. Tie-Line definitions: PJM defines a Tie Line as a circuit connecting two balancing authority areas, control areas, or fully metered electric system regions. Accurate modeling and data acquisition for Tie Lines are particularly significant due to their impact on Automatic Generation Control (AGC) parameter calculations, network model connectivity, and market settlements. There are three main categories of Tie Lines recognized by PJM for varying operational and settlements purposes - External Tie Lines, Dynamic Transfers and Internal Tie Lines. Internal Tie Lines are further classified as Control Zone Tie Lines; transmission Zone Tie Lines; Fully Metered EDC Tie Lines; and East EHV Tie Lines.

7. Tie-Line telemetry/measurement requirements: For each class of Tie-line data, the meter accuracy, redundancy and periodicity of data transmission are specified.

8. ANSI/IEEE reference: PJM requires members to reference applicable ANSI/IEEE standards for designing and maintaining their metering system.

9. Maintenance/ Calibration intervals: Proper Maintenance and calibration is the assurance of the metering system accuracy. PJM requests equipment owners to develop, maintain and execute their own testing, calibration and maintenance policies and procedures. All devices and systems that provide PJM with billing and system control and monitoring data should be covered by either a periodic test plan or exception-based maintenance plan. PJM can request an investigation at specific locations based on actual or projected market and system conditions into the existing overall or component accuracy (and telemetry periodicity).

10. Grandfather Clause: To help close the gap caused by the ambiguity of current revision of Manual 01 section 5, PJM established a grandfather clause depending on the installation date of the equipment in question and the start date of each metering requirement for different metering categories as defined in design component 5. Replacing, upgrading or modifying existing grandfathered equipment may cause the equipment installation date to be reset and the equipment no longer grandfathered.

11. PJM historical database of meters and meter test results: For billing meters, the results of all accuracy testing shall be reported to PJM. PJM maintains a metering database documenting the test results for all PJM Member metering tests that show errors of greater than 1% for auditing purposes. For System Control and Monitoring, PJM will also document the conclusions of significant investigations for history and future guidance.

2. Standing Committee Results

[Pending]

3. Additional Recommendation

The metering task force also recommends the following areas should be further researched and discussed in the future:



- Minimum metering requirements of location and density for ensuring the system observability;
- Metering requirements for distributed generation.

Appendix I: Supplemental Documents

1. [Metering Task Force Problem Statement](#)
2. [Metering Task Force Issue Charge](#)
3. [Metering Task Force Charter](#)
4. [Option & Solution Matrix](#)
5. [OA & OATT Revision](#)
6. [M01 revision 33](#)

Appendix II: Stakeholder Participation

Last Name	First Name	Company	Sector
Brown	James	AEP Appalachian Transmission Company, Inc.	Transmission Owner
Cocchiarale	Frank	AEP	Electric Distributor
Dunn	Nathaniel	AEP Appalachian Transmission Company, Inc.	Transmission Owner
Werner	Christopher	AEP Appalachian Transmission Company, Inc.	Transmission Owner
Dobbins	Charles	American Municipal Power, Inc.	Generation Owner
Norton	Chris	American Municipal Power, Inc.	Generation Owner
Samborsky	Mark	American Electric Power Company, Inc.	Not Applicable
Schneider	Kirk	American Electric Power Company, Inc.	Transmission Owner
Borkoski	Justin	American Transmission Systems, Inc.	Transmission Owner
Juhrden	Jane	Atlantic City Electric Company	Electric Distributor
Jablonski	James	Borough of Butler, Butler Electric Division	Electric Distributor
Reid	Ryan	Buckeye Power, Inc.	Transmission Owner
Davis	Connie	City of Cleveland, DPU, Div of Cleveland Public Pwr	Not Applicable
Lee	TINA	Cogen Technologies	Electric Distributor
Anderson	Jay	Commonwealth Edison Company	Transmission Owner
Campbell	Gregory	Commonwealth Edison Company	Transmission Owner
Sharp	Chris	Commonwealth Edison Company	Transmission Owner



Price	Dann	Constellation NewEnergy, Inc.	Electric Distributor
Dessenger	Harry	Customized Energy Solutions, Ltd.*	Transmission Owner
Filomena	Guy	Customized Energy Solutions, Ltd.*	Transmission Owner
Johnson	Carl	Customized Energy Solutions, Ltd.*	Transmission Owner
Sasser	Jonathan	Customized Energy Solutions, Ltd.*	Transmission Owner
Hemmert	John	Dayton Power & Light Company (The)	Generation Owner
Russ	Michael	Dayton Power & Light Company (The)	Transmission Owner
Heise	Randi	Dominion Virginia Power	Transmission Owner
Kerr	Jack	Dominion Virginia Power	Transmission Owner
Wells	Michael	Dominion Virginia Power	Transmission Owner
James	Louise	Dominion Energy Marketing, Inc.	Generation Owner
Adams	Dana	Duke Energy Ohio, Inc. (EDC)	Transmission Owner
Bowers	Troy	Duke Energy Ohio, Inc.	Electric Distributor
Garnett	Bryan	Duke Energy Ohio, Inc.	Electric Distributor
Ploeger	Charlie	Duke Energy Ohio, Inc.	Other Supplier
Abate	Stephen	Duquesne Light Company	Transmission Owner
Frohnert	Rick	Duquesne Light Company	Transmission Owner
Harchick	Jason	Duquesne Light Company	Electric Distributor
Pilch	Joseph	Duquesne Light Company	Transmission Owner
Beeker	Rodney	East Kentucky Power Cooperative, Inc.	Transmission Owner
Welty Jr	Peter	Easton Utilities Commission	
Benchek	Jim	FirstEnergy Solutions Corp.	Transmission Owner
Csonka	Joe	FirstEnergy Corporation	Generation Owner
Thurston	David	FirstEnergy Corporation	Not Applicable
Hohlbaugh	Doug	FirstEnergy Solutions Corp.	Transmission Owner
Marton	David	FirstEnergy Solutions Corp.	Transmission Owner
Miller	Michael	FirstEnergy Solutions Corp.	Transmission Owner
Reed	John	FirstEnergy Solutions Corp.	Transmission Owner
Schneider	Jonathan	FirstEnergy Solutions Corp.	Transmission Owner
Smith	William	FirstEnergy Solutions Corp.	Transmission Owner



Hagaman	Derek	GT Power Group	Not Applicable
Pratzon	David	GT Power Group	Not Applicable
Foladare	Kenneth	IMG Midstream LLC	Generation Owner
Cianfarani	Adam	ITC Interconnection LLC	Other Supplier
Kogut	George	New York Power Authority	Other Supplier
Kingston	Amber	North Carolina Electric Membership Corporation	Transmission Owner
Solic	Anthony	Ohio Edison Company	Transmission Owner
Carmean	Greg	OPSI	Not Applicable
Wiegand	Mark	Orange & Rockland Utilities	Transmission Owner
Salem	Jay	Pennsylvania Electric Company	Electric Distributor
Brubaker	Marge	PEPCO Holdings	Transmission Owner
Shaffer	Brian	PEPCO Holdings	Transmission Owner
Anders	David	PJM Interconnection, LLC	Not Applicable
Baranowski	John	PJM Interconnection, LLC	Not Applicable
Budney	Dave	PJM Interconnection, LLC	Not Applicable
Caven	Augustine	PJM Interconnection, LLC	Not Applicable
Connell	Jason	PJM Interconnection, LLC	Not Applicable
Coyne	Suzanne	PJM Interconnection, LLC	Not Applicable
Derin	Zehra Bilge	PJM Interconnection, LLC	Not Applicable
Fahr	Suzie	PJM Interconnection, LLC	Not Applicable
Glatz	Suzanne	PJM Interconnection, LLC	Not Applicable
Hoffman	Jeffrey	PJM Interconnection, LLC	Not Applicable
Huang	Nancy	PJM Interconnection, LLC	Not Applicable
Kappagantula	Srinivas	PJM Interconnection, LLC	Not Applicable
Kharod	Ankit	PJM Interconnection, LLC	Not Applicable
Kovler	Ed	PJM Interconnection, LLC	Not Applicable
Kuras	Mark	PJM Interconnection, LLC	Not Applicable
McAnany	James	PJM Interconnection, LLC	Not Applicable
McCombIII	John	PJM Interconnection, LLC	Not Applicable
Nice	Ryan	PJM Interconnection, LLC	Not Applicable



Tiemann	Jeff	PJM Interconnection, LLC	Not Applicable
Weiss	Glenn	PJM Interconnection, LLC	Not Applicable
Cook	Patrick	Potomac Electric Power Company	Transmission Owner
Crawford	Bryan	Potomac Electric Power Company	Transmission Owner
Maestas	Tracy	PPL Electric Utilities Corp. dba PPL Utilities	Transmission Owner
Weidner	Jon	PPL Electric Utilities Corp. dba PPL Utilities	Transmission Owner
Corash	Richard	PSEG Energy Resources and Trade LLC	Transmission Owner
Ellis	David	Public Service Electric & Gas Company	Transmission Owner
Cain	Paul	Raven Power	Electric Distributor
Yu	Joel	Rockland Electric Company	Transmission Owner
Tewksbury	Cleyton	Sapphire Power Marketing, LLC	Generation Owner
Bucci	Cindy	Southern Maryland Electric Cooperative	Electric Distributor
Greening	Michele	Talen Energy Marketing, LLC	Not Applicable
Hartman	Gary	Talen Energy Marketing, LLC	Electric Distributor
Roeder	William	Talen Energy Marketing, LLC	Generation Owner
Scoglietti	Barbara	Tangent Energy Solutions, Inc.	
Kozlowski	David	UGI Utilities, Inc.	Other Supplier
Petrella	James	Vineland Municipal Electric Utility	Not Applicable