

4.2 Data Management and Metering Requirements

4.2.1 Data Management and Security

Each Generator shall supply the necessary planning and operating data required to accurately model, schedule, and monitor the PJM system. Specific data requirements for power system applications, production cost and reliability assessment are located in the PJM Manual for PJM Regional Transmission Planning Process (M14B), Attachment H – Power System Modeling Data. This data must include, but is not limited to:

- Expected unit operations and desired market service/segment.
- Stability study data.
- Step-up transformer data (impedance and tap setting).
- Relay settings and generator protection package.
- Generator operating curves and associated test data (reactive/saturation).
- Special operating restrictions (including environmental).
- Identification of equipment ownership and maintenance responsibilities.
- Test data for metering calibration, backup communications, and relays.
- Any other data required to certify a generator as eligible to participate in a specific market segment or service.

The Generator shall also provide telemetered data to the Supervisory Control and Data Acquisition (SCADA) system or via ICCP to the PJM Energy Management System computers. Computer systems and metering shall be consistent with PJM practices, and compatible with PJM computer and communication systems.

Examples of this required data include: MW, MVAR, MWh, voltage, and equipment status (i.e., open/close). The data is to be provided in accordance with standards contained with the *PJM Manuals for Control Center and Data Exchange Requirements (M-01)*, *Pre-Scheduling Operations (M-10)*, *Energy & Ancillary Services Market Operations (M-11)*, and *Balancing Operations (M-12)*. PJM may require the ability to disconnect the facility from the PJM system via the Transmission Owner's SCADA system.

It is required that data be sent to PJM automatically. In the event that the data is not automatically received by PJM, the Generation Owner shall call PJM with the required data at intervals specified by PJM. The Generation Owner must correct any problems associated with the failure of data-transmission equipment within a reasonable time.

The Generator and Transmission Owner shall promptly exchange all information relating to all conditions which affect (or could affect) the operations of any facility reporting data.

The Generator shall communicate the outage of any data communication equipment connecting the facility to the PJM system in accordance with the following requirements:

- Each facility will be assigned to one of the PJM Transmission Owners as its primary contact, unless arrangements are made to communicate information directly to PJM. The assignment is based upon the voltage level of the connection to the Transmission System and the geographic location of the facility.

- All planned and maintenance outages of data communications equipment requiring the involvement of PJM personnel must be requested by the Generator. All information must be in a format defined by PJM. Refer to Section 3: Data Exchange Requirements of manual M-01, Control Center and Data Exchange Requirements, specifically Section 3.8 Planning, Coordination, and Notification of System Changes and Events.
- Advance notification of planned and maintenance outages must meet the requirements defined in the PJM Manual for Pre-Scheduling Operations (M-10).

Additional specific data requirements are defined in other sections of this manual. All records must be retained in accordance with NERC, FERC and PJM data retention requirements. All back-up voice and data communication plans and test procedures must be documented and provided to PJM.

4.2.2 Metering Plan

In order to establish a metering plan for new generation, a PJM Client manager is assigned. A kick-off meeting between the client manager and the generation owner will be held to discuss the following issues:

- Project schedule including testing/commercial dates
- Options for providing real-time and revenue data
- Business plan for the unit(s) - The new participant is required to apply for the necessary PJM Tools accounts based on the individual business plan.
- PJM metering requirements - To satisfy these requirements, all generators connecting to the PJM system are required to install and operate metering and related equipment capable of recording and transmitting all voice and data communications. Specific data metering requirements depend on the size and business plan of the generator connecting to the PJM system.

Several factors determine the real-time telemetry to PJM requirements for a generator. The following table shows the criteria for which a generator may be required to provide real-time telemetry to PJM. If one or more of the criteria are true for that generator, then telemetry is required.

Criteria	Real-Time Telemetry Requirements
Generators participating in the PJM market as capacity resources	Real and reactive power
Generators 10 MW (Maximum Facility Output) or larger	Real and reactive power
Generators greater than 1 MW (Maximum Facility Output) and connected at a bus operating at 50 kV or greater	Real and reactive power
Solar parks 3 MW (Maximum Facility Output) or greater	Real and reactive power (see Section 12.2 for additional requirements)

Criteria	Real-Time Telemetry Requirements
Distributed generators (such as, the treatment of many units dispersed over a wide area as one aggregated unit) modeled less than 10 MW (Maximum Facility Output)	Real and reactive data at the BES injection point of accuracy within 10% of hourly MWh settlements data (revenue meter or accumulator data)
<u>Generators that will also participate as PJM demand response resources when they will reduce load and have PJM-approved interconnection rights to inject power.</u>	<u>Real and reactive data, based on the Generator criteria in this table, at the point of interconnection and real and reactive power for the generators.</u>

Generators not meeting any of the criteria above are generally not required to supply real-time telemetry to PJM. However, PJM may require real-time telemetry from any generator based on specific topology, network security, operations or market needs. Generators that are not required to supply real-time (two-second scan) metering will not be eligible to set real-time LMP. Revenue-related information is necessary for very small units. This information can be obtained from the local utility or manually read by the customer and supplied to PJM via Power Meter. If desired, a direct connection to PJM can be established.

Generators that are required to supply real-time and revenue information can supply this through the local utility's connection to PJM, or if desired, via a direct connection from the generator to PJM. Real-time information will be collected at a two- ten second data rate, and revenue information will be collected hourly. The revenue information represents the accumulated energy for the previous hour.

The required revenue information is necessary to satisfy the needs of PJM's Market Settlements program. The real-time information is required for PJM's Energy Management Applications (State Estimator, Security Analysis, etc.).

4.2.3 Metering for Individual Generators

PJM does not require Generation Owners to directly connect to PJM, but leaves this as an option if it enhances the owner's ability to participate in PJM markets and functions. A generation owner has a number of options with respect to information acquisition and transmission.

At the most basic level, a Generation Owner can negotiate data transmission to and from PJM through the local utility or transmission facilities owner. This allows the Generation Owner the flexibility to use already proven and acceptable methods of data transfer to minimize initial start-up costs and procedures, while meeting all of the current requirements for providing data to PJM. This basic communication can be supplemented with the use of the Internet-based PJM Tools such as inSchedule and Data Viewer, further expanding the data transfer capabilities between the customer and PJM without a direct connection to PJM.

A Generation Owner may decide that direct connection to PJM makes the best business sense, so facilities have been provided to make that connection as simple and cost effective as possible. The Generation Owner that decides to connect directly to PJM will be required to meet requirements determined by the net MW produced and the markets in which the Generation Owner decides to participate.

Additionally, information about PJM's operational status and other types of non-market sensitive data can be directly communicated through these same facilities. This type of communication is not required but is provided by PJM as a value-added service to enhance participation in PJM markets.

PJM's data requirements are described in two categories: real-time information and non-real time information. Either or both of these types of data can be directly communicated to PJM depending on the customer requirements and operating agreement with the local utility.

Real-Time Data

Real-time or instantaneous information is defined as data required by PJM that determines system security and stability as well as congestion and LMP. The minimum data model for real-time data transmission requires:

- Instantaneous Net (+/-) MW for each unit, measured on the low-side of generator step-up transformer
- Instantaneous Net (+/-) MVAR for each unit, measured on the low-side of generator step-up transformer
- Distributed generators modeled at less than 10MW must provide Instantaneous Net (+/-) MW and MVAR at aggregation point (BES injection point) based on an agreed upon algorithm.
- Generators that will also participate as PJM demand response resources and that have PJM approved interconnection rights to inject power must provide Instantaneous Net (+/-) MW and MVAR at the point of interconnection and Instantaneous Net (+/-) MW and MVAR for each unit, measured on the low-side of generator step-up transformer at a point where it does not include associated load served by the generator.

Additional transmitted data may include bus voltages, circuit breaker status, and other data.

Account Metering

Non-real-time or revenue information is needed by PJM's applications and systems that determine Grid Accounting and Energy Interchange such as Power Meter. The minimum data-model for revenue data transmission requires:

- Hourly Compensated MWh delivered for each unit.
- Hourly Compensated MWh received for each unit.
- Hourly Compensated MVARh delivered for each unit (not currently required).
- Hourly Compensated MVARh received for each unit (not currently required).

Note:

The MVARh revenue information will be considered a requirement in the event that PJM implements a Reactive Power Market.

Additional information on PJM Metering requirements may be found in Sections 3 and 5 of the *PJM Manual M-01, Control Center and Data Exchange Requirements*.

Data Communications Systems and Requirements

Data communications systems and requirements are dependent on the type of facilities connected to PJM, category of generator(s) based on Net MW, and market participation. The Generation Owner with facilities directly connected to PJM must, at a minimum, provide PJM with the contact name and voice phone number of person or persons responsible for the continuous operation of that equipment.

Additionally, the Generation Owner with multiple connected facilities may have to provide centralized contact and control information to minimize confusion and downtime resulting from equipment failure. Additional data or control room functionality may be necessary and will be determined on a per-generator basis. For additional information regarding these requirements refer to PJM Manual M-01, Control Center and Data Exchange Requirements.

For questions about Data and Metering Requirements, contact the PJM Client Manager or PJM's Member Relations at 610-666-8980.