



Glossary for Power Market Primers

Abbreviations

AVR	– Automatic voltage regulator	MVA	– Mega-volt-ampere
CAISO	– California Independent System Operator	MVAr	– Mega-volt-ampere reactive
CRR	– Congestion revenue right	MW	– Megawatt
DAM	– Day-ahead market	MWh	– Megawatt-hour
EIS	– Energy imbalance service	NERC	– North American Electric Reliability Corporation
ERCOT	– Electric Reliability Council of Texas	NYISO	– New York Independent System Operator
FERC	– Federal Energy Regulatory Commission	OASIS	– Open Access Same-Time Information System
FTR	– Financial transmission rights	OOMC	– Out-of merit commitment
GWh	– Gigawatt-hour	OOMC	– Out-of-merit capacity
Hz	– Hertz	PJM	– PJM Interconnection, L.L.C.
ICT	– Independent coordinator of transmission	PMA	– Power Marketing Administration
IE	– Imbalance energy	PSC	– Public Service Commission
IPP	– Independent power producer	PUC	– Public Utility Commission
ISO	– Independent system operator	REP	– Retail electric provider
ISO-NE	– Independent System Operator of New England	RPS	– Renewable portfolio standards
kV	– Kilovolt	RTO	– Regional transmission organization
kW	– Kilowatt	SPP	– Southwest Power Pool
kWh	– Kilowatt-hour	TCC	– Transmission congestion contracts
LBMP	– Locational based marginal pricing	VAr	– Volt-ampere reactive
LIP	– Locational imbalance price	W	– Watt
LMP	– Locational marginal prices	Wh	– Watt-hour
LSE	– Load serving entities		
MISO	– Midwest Independent System Operator		

A

Adequacy – See *Resource Adequacy*.

Ancillary Services – Services necessary to ensure and support the reliability of the transmission of electricity across the grid. The ancillary services include operating reserve, frequency regulation (i.e., maintaining system frequency within a set range), and voltage control (i.e., maintaining system voltage within a set range).

Ancillary Services Market Administrator – An entity that manages services necessary to support the reliable operation of the transmission system and provision of electricity at appropriate frequency and voltage levels.¹

Ancillary Service Shadow Price – The cost of having to procure one additional megawatt for a given ancillary service. See also: *Shadow Price* and *Regulation Market Clearing Price*.

Assets – Individual units (generators), plants, load acting as a resource (controllable load and demand response resource) and load zones.²

Automatic Voltage Regulator (AVR) – A device on a generation resource or a control system at the facility of a generation resource used to automatically control the voltage to an established voltage set point.³

B

Balancing Authority – An entity that integrates resource plans regionally and maintains, in real time, the balance of electricity resources and electricity demand.¹

Bid – A request to sell or purchase megawatts at a specific location submitted into the wholesale market.⁴ See also: *Demand Bid* and *Generation Bid*.

Bilateral Contracts – A contract between two parties for the sale and delivery of a service (i.e., energy, capacity, and/or ancillary services) without going through the wholesale market that provides price and other terms and conditions. These contracts may be internal or external to the ISO/RTO area. The ISO/RTO must be aware of the contract in order to maintain reliability.

Black Start Capability – The ability of generating unit to start without support of the transmission grid.⁴ See also: *Black Start Unit*.

Black Start Service – An ancillary service provided by a generation resource able to start without support of the transmission grid.³ See also: *Black Start Unit*.

Black Start Unit – A generating unit that has the ability to be started without outside electricity supply.⁴ Black Start units are necessary to re-energize the transmission system following a system-wide blackout. They must have the ability to re-energize an electrical bus, to provide real and reactive power capability for a period of time identified by restoration requirements, and provide frequency and voltage control under varying load.⁵

Blackout – A period where no electric service is available in a particular area.

¹ United States Government Accountability Office. (2008). *Electric Restructuring: FERC Could Take Additional Steps to Analyze Regional Transmission Organizations' Benefits and Performance*. Retrieved on September 16, 2011 from <http://www.gao.gov/new.items/d08987.pdf>

² SPP. (2011). *Glossary*. Retrieved on October 25, 2011 from <http://www.spp.org/glossary.asp?letter=E>

³ ERCOT. (2011). *Glossary*. Retrieved on October 25, 2011 from <http://www.ercot.com/glossary>

⁴ ISO New England. (2011). *Glossary*. Retrieved on October 25, 2011 from <http://www.iso-ne.com/support/training/glossary/>

⁵ Entergy. (2011). *Transmission System Facts*. Retrieved on October 25, 2011 from http://www.entergy.com/energydelivery/transmission_system_facts.aspx

Brownout – An intentional or unintentional drop in voltage in a transmission and/or distribution grid. The name is coming from a fact that when voltage drops lightning dims slightly. The intentional brownout is used to reduce load during an emergency.⁶

Bulk Power System – The interconnected electrical generating resources, transmission facilities, tie lines with neighboring systems, and associated equipment used to produce and transmit electric energy, generally operated at 100 kV or higher.¹ See also: *Power System*.

Bus/Electrical Bus – A physical transmission element that serves as a common connection for two or more elements such as: loads, lines, transformers, generators and other transmission devices and equipment.^{7,3,8}

C

Capability – The maximum load that a generating unit or other electrical apparatus can carry under specified conditions for a given period of time without exceeding approved limits of temperature and stress.²

Capability Period – One of two specific time periods within a power year for buying and selling electric capacity. A power year is split into capability periods because different demand requirements exist during the year and the output of generator resources is seasonally dependent (temperature, wind, etc.). A RTO/ISO determines the duration of the capability period. For example, in ISO New England, the summer capability period is June 1 through September 30; the winter capability period is October 1 through May 31.⁴ In New York ISO, the summer period is May 1 through October 31; the winter period is November 1 through April 30.

Capacitor – A device whose primary purpose is to introduce reactive power into an electrical circuit. Shunt capacitors are normally used to produce reactive power for voltage control. Series capacitors are normally used to reduce the effective reactance of a circuit.⁹ See also: *Reactive Power* and *Inductor*.

Capacity – The amount of electric power delivered or required for which a generator, turbine, transformer, transmission circuit, station or system is rated by the manufacturer.²

Capacity Auction/ Forward Capacity Auction – An annual auction of the Forward Capacity Market during which the price for capacity will be set based on required capacity quantity that will satisfy the region's unforced capacity obligation.^{1,3}

Capacity Market – A market in which load-serving entities make capacity payments to providers (owners of generators and demand resources) to ensure the long-term availability of sufficient capacity for the reliable operation of the bulk power grid. Capacity markets use a capacity auction process to procure sufficient capacity for the delivery year.

Capacity Market Administrator – Administers a system to procure a sufficient portfolio of supply and demand resources to meet future electricity needs and encourage investment.¹

Capacity Payments – A payment received in exchange for making electrical capacity available.¹⁰

⁶ Steven Blome. (2007). *Electric Power System Basics: For the Nontechnical Professional*, IEEE Press Series on Power Engineering.

⁷ Potomac Economics. (2011). *2010 State of the Market Report for the MISO Electricity Market*, June 2011

⁸ Nodal Exchange. (2011). *Glossary*. Retrieved on March 25, 2011 from http://www.nodalexchange.com/resource_center/glossary.php

⁹ PJM. (2011). *Glossary*. Retrieved on October 25, 2011 from <http://www.pjm.com/Home/Glossary.aspx>

¹⁰ Energy Network Operations Center. (2011). *Glossary*. Retrieved on October 25, 2011 from <http://www.enenoc.com/our-resources/glossary>

Capacity Zone – A zone determined before each capacity auction. Each export-constrained zone and any import-constrained zone for which the amount of capacity projected to be installed in a load zone is less than that load zone's forecasted local sourcing requirement.⁴ See also: *Local Sourcing Requirement*.

Clearing Price – See *Market Clearing Price*.

Congestion – A condition that arises on the transmission system when one or more restrictions prevent the economic dispatch of electric energy from serving load.¹

Congestion Cost/Cost of Congestion – Costs that are approximately equal to the difference in locational marginal prices across the congested interface, multiplied by the transfer amount.⁷

Congestion Revenue Right (CRR) – A financial instrument that entitles the holder to be charged or to receive compensation, depending on the instrument, when the transmission grid is congested in the Day-Ahead Market or in the Real-Time Market.³ It is used in CAISO and ECROT. See also: *Financial Transmission Rights* and *Transmission Congestion Contracts*

Contingency – The unplanned disconnection of a power system element, such as a transmission facility or a generator, from the system.⁴

Control Area – An electric power system or combination of electric power systems to which a common automatic generation control scheme is applied in order to: 1) match, at all times, the power output of the generators within the electric power system(s), and capacity and energy purchased from entities outside the electric power system(s), with the Load within the electric power system(s); 2) maintain scheduled interchange with other Control Areas; 3) maintain the frequency of the electric power system(s) within reasonable limits; and 4) provide sufficient generating capacity to maintain operating reserves.⁴

Cost-based Payment/Cost-based Service – Payment/Service in which offers shall not exceed the variable cost of producing energy or other service.¹⁰

Cost of New Entry – As a concept, the price of capacity in \$/kW-month or \$/MW-day that is needed to attract sufficient new capacity.⁴

Curtailment Service Provider – A company that serves as an intermediary between utilities and customers, pooling together groups of customers who participate in demand response programs to reduce energy usage during periods of peak demand. More commonly known as Demand Response Aggregators.¹¹ See also: *Demand Response Aggregators*.

Customer – An entity that "does business" with ISO/RTO, such as a transmission customer or market participant.⁴

D

Day-Ahead Market (DAM) – A forward market in which hourly (typically) prices are calculated for energy delivery to a specific location based on generation offers, demand forecasts, and scheduled bilateral power sales.

Day-Ahead Market Administrator – Administers a forward market where electricity is bought and sold for use the following day based on projected customer needs.¹

Delivery Year – Planning period for which resources are being committed and for which a constant load obligation for the entire region exists. For example, the 2007/2008 Delivery Year in PJM corresponds to the June 1, 2007 – May 31, 2008 planning period.¹⁰

Demand – The amount of electrical power used; the level of electricity consumption at a particular time measured in megawatts.⁴ See also: *Load*.

¹¹ LOBOS. (2013). *Glossary*. Retrieved on February 25, 2013 from <http://enerliance.com/support/terms-definitions/>

Demand Bid / Demand Offer – A request to purchase an amount of electric energy at a specific location.⁴

Demand Curve – A graphic representation of the relationship between energy price and the quantity of the energy demanded. It is drawn with price on the vertical axis of the graph and quantity demanded on the horizontal axis.¹² See also: *Supply Curve*.

Demand Resource – A source of capacity whereby a customer reduces the demand for electricity from the bulk power system, such as by using energy-efficient equipment, shutting off equipment, and using electricity generated on site.⁴ See also: *Demand Response and Interruptible Load for Reliability Resources*.

Demand Response – End-use customers' reduction of their use of electricity in response to power grid needs, economic signals from a competitive wholesale market or special retail rates.¹⁰ See also: *Demand Resource and Interruptible Load for Reliability Resources*.

Demand Response Aggregators – A company that serves as an intermediary between utilities and customers, pooling together groups of customers who participate in demand response programs to reduce energy usage during periods of peak demand. Also known as Curtailment Service Providers.¹² See also: *Curtailment Service Providers*.

Deregulation – Elimination of some or all regulations from a previously regulated industry or sector of an industry.¹³ See also: *Restructured Electric Industry*.

Dispatch – Electronic or verbal instructions to generators, transmission facilities, and other market participants to start up, shut down, raise or lower generation, change interchange schedules, or change the status of a dispatchable load in accordance with applicable contracts or demand bid parameters.¹⁴

Dispatch Signal – The control signal, expressed in dollars per megawatt-hour, calculated and transmitted continuously and dynamically to direct the output level of all generation resources dispatched by ISO/RTO in accordance with the offer data.¹⁰

Distribution Lines – Low-voltage electric power lines (typically <35 kV).⁴

Distribution System / Distribution Grid / Distribution Network – A system for the delivery of energy from the transmission grid to customers.³

E

Electric Energy – The ability of an electric current to produce work (heat, light, another form of energy); the generation or use of electric power over a specified time, usually expressed in gigawatt-hour (GWh), megawatt-hour (MWh), or kilowatt-hour (kWh).⁴ See also: *Energy*.

Electric Industry – An industry that produces and delivers electric energy, often known as power, or electricity.

Electric Power – The rate at which electric energy is transferred or used to do work, measured in watt (W) or kilowatt (kW – thousands of watts) or megawatts (MW – millions of watts).⁴ See also: *Units of Electricity*.

¹² Business Dictionary. (2013). *Demand Curve*. Retrieved on January 10, 2013 from <http://www.businessdictionary.com/definition/demand-curve.html>

¹³ U.S. Energy Information Administration. (2013). *Glossary*. Retrieved on January 10, 2013 from <http://www.eia.gov/tools/glossary/index.cfm>

¹⁴ California ISO. (2011). *Glossary of Terms and Acronyms*. Retrieved on October 25, 2011 from <http://www.caiso.com/Pages/glossary.aspx?View={02340A1A-683C-4493-B284-8B949002D449}&FilterClear=1>

Electric Reliability Organization – The organization certified by FERC to establish and enforce reliability standards for the bulk-power system, subject to FERC review.¹⁵ See also: *North American Electric Reliability Corporation (NERC)*

Electricity Consumer – An entity such as a person, State agency, or Federal agency, to which electric energy is sold other than for purposes of resale.¹⁵

Electricity Market / Energy Market – A system for purchasing and selling electricity using supply and demand to set the price. In general, electricity markets include electric energy markets, capacity markets, and ancillary services markets, a part of which are regulation markets and operating reserve markets.¹ See also: *Energy Market, Power Market and Wholesale Electric Energy Market.*

Electricity (Power) Marketers – Business entities engaged in buying and selling electricity. Power marketers do not usually own generating or transmission facilities. Power marketers take ownership of the electricity and are involved in interstate trade. These entities file with FERC for status as a power marketer.¹⁴

Electricity Supplier – Companies supplying electricity to the consumers. See also: *Generating Companies and Electricity (Power) Marketers.*

Energy – The generation or use of electric power over a specified time, usually expressed in gigawatt-hour (GWh), megawatt-hour (MWh), or kilowatt-hour (kWh).⁴ See also: *Electric Energy.*

Energy Efficiency Resources – An energy resource capable of yielding energy and demand savings that can displace electricity generation, such as from coal, natural gas, nuclear power, wind power, and other supply-side resources.¹⁶

Energy Imbalance Service (EIS) – Energy supplied by others when actual electricity production (or usage) is different from expected production (or usage). EIS is the dollar amount associated with the Imbalance Energy (IE). EIS is calculated by taking the amount of IE and multiplying by the price at a specific point on the energy grid.²

Energy Imbalance Service (EIS) Market – Unique to the Southwest Power Pool (SPP), the EIS Market provides market participants a mechanism necessary to offer their resources into the marketplace for use in eliminating the imbalance energy. In the EIS marketplace, SPP owns the responsibility of accounting for and financially settling all EIS amounts.¹⁰ The EIS Market will be replaced with a real-time market when a new market structure is launched in 2014. See also: *Imbalance Energy.*

Energy Market /Electric Energy Market – A system for purchasing and selling electric energy using supply and demand to set the price.¹ See also: *Electricity Market, Power Market and Wholesale Electric Energy Market.*

F

Federal Energy Regulatory Commission (FERC) – An independent commission that regulates the interstate transmission of electricity, natural gas, and oil. As part of that responsibility, FERC regulates the transmission and wholesale sales of electricity in interstate commerce; reviews certain mergers and acquisitions and corporate transactions by electricity companies; reviews the siting application for electric transmission projects under limited circumstances; licenses and inspects private, municipal, and state hydroelectric projects; protects the reliability of the high voltage interstate transmission system through mandatory reliability standards; monitors and investigates energy markets; enforces regulatory

¹⁵ Public Utility Regulatory Policies Act of 1978. (2012). *16 USC Sec. 2602*. Retrieved on March 26, 2013 from <http://uscode.house.gov/download/pls/16C46.txt>

¹⁶ ACEEE. (2013). *Energy Efficiency as a Resource*. Retrieved on January 10, 2013 from <http://aceee.org/topics/energy-efficiency-resource>

requirements through imposition of civil penalties and other means; and also administers accounting and financial reporting regulations and conduct of jurisdictional companies.^{4, 17}

Federal Power Agencies – Any agency or instrumentality of the United States (other than the Tennessee Valley Authority) which sells electric energy.¹⁸

FERC Order 888/889 – The two orders made in 1996 by the US Federal Energy Regulatory Commission establishing the U.S. Federal Energy Regulatory Commission’s legal authority to require utilities owning transmission lines to permit the use of their transmission assets by third parties.¹⁹ FERC Order 888 required opening access to transmission lines to competing power generators, the unbundling of functional charges, and establishing a mechanism for recovery of “stranded costs.” Issued in conjunction with Order 888, FERC Order 889 facilitated competitive markets by assuring transparency, accuracy, and consistency in sharing of information critical to making intelligent competitive decisions.²⁰ Order 889 established a common standard of conduct among power industry participants. In order to prevent gaming or obscuring of information, Order 889 required accounting systems for transmission, distribution, and generation facilities to be separate. Additionally, FERC Order 889 obligated all investor-owned utilities to share the availability of transmission capacity, ancillary services, scheduling of power transfers, economic dispatch, current operating conditions, system reliability, and responses to systems conditions on an Open Access Same-Time Information System (OASIS; formerly referred to as Real-Time Information Networks). See also: *Independent System Operator (ISO)*, *Regional Transmission Organization (RTO)* and *FERC Order 2000*.

FERC Order 2000 – The order made in 1999 by the US Federal Energy Regulatory Commission mandating the creation of Regional Transmission Organizations throughout the United States, albeit participation is voluntary.²¹ The intent of FERC Order 2000 was to remove the residual barriers to a competitive market. Order 2000 delineated several of FERC’s expectations such as regional operation of high-voltage transmission, elimination of discriminatory practices leaving minimal economic or operational obstacles to trade, open access to the network and information about the network (e.g., OASIS), and true access and exit from the transmission network establish ease of opportunity. To meet these expectations, Order 2000 established that RTOs should have full independence from market participants, as well as responsibility and authority regarding short-term grid stability, operational control of all transmission assets in their region, and an appropriate regional configuration. In support of these characteristics, each RTO assumed key market and technical functions within its area, such as design and administration of tariffs, management of congestion and parallel path flows, and continual development of OASIS, monitoring the market, and planning and expansion of transmission assets. See also: *Independent System Operator (ISO)*, *Regional Transmission Organization (RTO)* and *FERC Order 888/889*.

¹⁷ Federal Energy Regulatory Commission (FERC). (2011). *What FERC does*. Retrieved on October 25, 2011 from <http://www.ferc.gov/about/ferc-does.asp>

¹⁸ Cornell University Law School. (2013). *16 USC § 796 – Definitions*. Retrieved on January 10, 2013 from <http://www.law.cornell.edu/uscode/text/16/796>

¹⁹ Federal Energy Regulatory Commission. (1996). *Order No. 888: Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities and Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*. Retrieved on September 16, 2011 from <http://www.ferc.gov/legal/maj-ord-reg/land-docs/order888.asp>

²⁰ Federal Energy Regulatory Commission. (1996). *Order No. 889: Open Access Same-Time Information System (formerly Real-Time Information Networks) and Standards of Conduct*. Retrieved on September 16, 2011 from <http://www.ferc.gov/legal/maj-ord-reg/land-docs/order889.asp>

²¹ Federal Energy Regulatory Commission. (1999). *Order No. 2000: Establishment of Regional Transmission Organizations Proposals*. Retrieved on September 16, 2011 from <http://www.ferc.gov/legal/maj-ord-reg/land-docs/RM99-2A.pdf>

Financial Transmission Rights (FTR) – A financial instrument that a market participant can buy to hedge the price risk of day-ahead congestion caused by constraints on the transmission system. FTR holders have a right to receive, or an obligation to pay, the dollar amounts associated with congestion based on the amount of electric energy (MW) flowing between two specific locations.¹ It is used in PJM, ISO-NE and MISO. See also: *Congestion Revenue Right* and *Transmission Congestion Contracts*

Forced Outage – An outage results in the immediate reduction in output or unavailability of a generating unit due to a failure. A reduction in output or removal from service of a generating unit in response to changes in market conditions does not constitute a forced outage.¹⁰ See also: *Maintenance Outage*, *Outage*, *Planned Outage* and *Scheduled Outage*.

Forward Capacity Auction/Capacity Auction – An annual auction of the Forward Capacity Market during which the price for capacity will be set based on required capacity quantity that will satisfy the region's unforced capacity obligation.^{1,3}

Frequency – The rate of oscillation (cycles/second) of the alternating current in an electrical power system, measured in hertz (Hz). In the United States, the frequency rate is 60 Hz.⁴

Frequency Control – A generation control where the objective is to utilize all regulating generators to control frequency at a scheduled level.¹⁰

Frequency Regulation – The capability of maintaining electric frequency close to 60 Hz. A system operator has to continuously balance electricity supply with load to maintain the proper frequency by sending a control signal to generators to increase or decrease its power output in response to frequency deviation.¹⁰ See also: *Frequency Response*.

Frequency Response – The capability of a specific resource, with appropriate telecommunications, control and response capability, to increase or decrease its output in response to a regulating control signal to control for frequency deviations.¹⁰ See also: *Frequency Regulation*.

G

Generating Unit – An individual electric generator and its associated plant and apparatus whose electrical output is capable of being separately identified and metered.¹⁴

Generation – The production of electric energy from other sources of energy, expressed in megawatt (MW).⁴ See also: *Supply*.

Generation Assets – See *Generation Resource* and *Generator*.

Generation Companies – An entity that owns or operates generating plants. The generation company may own the generation plants or interact with the short-term market on behalf of plant owners.¹⁴ See also: *Electricity Supplier*.

Generation Interconnection – A process that includes any of the following studies: the Interconnection Feasibility Study, the Interconnection System Impact Study, and the Interconnection Facilities Study described in the standard large generator interconnection procedures.¹⁴

Generation Resource – A generator capable of providing energy or ancillary service.³ See also: *Generator*.

Generation Scheduling – A computer optimization program used by a scheduling coordinator to schedule generation resources required for future operating periods.¹⁰

Generator – The seller of energy or ancillary services produced by a generating unit.¹⁴ A facility that produces only electricity, commonly expressed in kilowatt-hour (kWh) or megawatt-hour (MWh). Electric generators include electric utilities and independent power producers.¹⁴ See also: *Generation Resource*.

Generator Bid – The quantity (MWh) and a price (\$) at or above which a generator has agreed to sell the next increment of energy for a specified interval of time.¹⁴ See also: *Bid*.

Generator Operator – An operator that controls, operates, or maintains generators to generate electric power.

H

Hour-Ahead Market – Market in which prices for energy delivery are calculated for the next hour delivery, typically in 15 minute increments, based on current supply and forecasted demand.³

Hub – An aggregation of generator and load nodes that is traded as a single contract node.⁸ It is a specific set of predefined nodes for which locational marginal prices are calculated and used to establish a reference price for electric energy purchases and the transfer of day-ahead adjusted load obligations and real-time adjusted load obligations and for the designation of Financial Transmission Rights.¹ See also: *Node* and *Load Zone*.

Hub Price – The price calculated as an average of the prices at all of the nodes defined of the hub. These nodes are electrically connected and are located in an area that has little congestion within it and therefore has a price that reflects the overall energy price.²² See also: *Nodal Price* and *Zonal Price*.

I

Imbalance Energy (IE) – The difference between what actually happens for each generator and load and what they prearranged through schedules. Mathematically the IE can be expressed as follows: $IE = \text{Actual Production or Usage} - \text{Scheduled Production or Usage}$.¹⁰ See also: *Energy Imbalance Service (EIS)*.

Incremental Auctions – Allow for an incremental procurement of resource commitments to satisfy either an increase in the region's unforced capacity obligation due to a load forecast increase, or a decrease in the amount of resource commitments due to a resource cancellation, delay, derating, or decrease in the nominated value of a planned demand resource.³ Also referred to as a reconfiguration auction in ISO New England. See also: *Reconfiguration Auction*.

Independent Coordinator of Transmission (ICT) – FERC approved Reliability Coordinator for grid security and stability and planning functions.⁵

Independent Market Monitor – An entity selected to monitor the wholesale electric market to detect and prevent market manipulation strategies and recommend measures to enhance the efficiency of the wholesale market.³

Independent Power Producer (IPP) – A corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for the generation of electricity for use primarily by the public, and which is not an electric utility.¹⁴

Independent System Operator (ISO) – An ISO performs similar duties to a Regional Transmission Organization (RTO). The ISO was FERC's initial attempt (as suggested in FERC Orders 888/889) to encourage the creation of independent organizations that would be responsible for managing a regional transmission grid, and provide open access to the grid. Open access to the grid means that all qualified companies would have the ability to put power onto the grid, regardless of who owned the particular transmission lines used. ISOs include: California ISO (CAISO), Midwest ISO (MISO), New York ISO (NYISO), ISO New England (ISO-NE), PJM, ERCOT, and Southwest Power Pool (SPP). See also: *Regional Transmission Organization (RTO)*, *System Operator*, *FERC Order 888/889* and *FERC Order 2000*.

²² ISO-NE. (2013). *Locational Marginal Pricing*. Retrieved on February 25, 2013 from http://www.iso-ne.com/nwsiss/grid_mkts/how_mkts_wrk/lmp/index-p3.html

Inductor/Reactor – A device with the primary purpose to introduce inductance into an electrical system. Shunt reactors are normally used to absorb reactive power for voltage control. Series reactors are normally used to increase the effective reactance on a circuit to limit fault current.¹⁰ See also: *Reactive Power* and *Capacitor*.

Installed Capacity – A generator or load facility that is capable of supplying and/or reducing the demand for energy in a control area for the purpose of ensuring that sufficient energy and capacity are available to meet the reliability rules. The installed capacity requirement includes a margin of reserve in accordance with the reliability rules.²³

Interconnection Study – Any of the following studies: the Interconnection Feasibility Study, the Interconnection System Impact Study, and the Interconnection Facilities Study described in the standard large generator interconnection procedures.¹⁴

Interruptible Load for Reliability Resources – A resource with a demonstrated capability to provide a reduction in demand.¹⁰ See also: *Demand Resource* and *Demand Response*.

Investor-Owned Utility – A utility owned by private investors, as opposed to one owned by a public trust or agency; a commercial, for-profit utility as opposed to a co-op or municipal utility. They are usually subject to different regulations than publicly-owned utilities and co-ops, and they pay taxes as corporate citizens.²⁴

L

Load – The amount of electrical power used; the level of electricity consumption at a particular time measured in megawatt. See also: *Demand*.⁴

Load Forecasting – A process used to determine load obligations calculations. The load forecasts include weather data and hourly load data.²

Load Serving Entities (LSE) – Entities that secure energy and transmission service (and related Interconnected Operations Services) to serve the electrical demand and energy requirements of its end-use customers.²⁵

Load Shedding – The systematic reduction of system demand by temporarily decreasing load in response to transmission system or area capacity shortages, system instability, or voltage control considerations.¹⁰

Load Zone/ Zone – An aggregation of all the load nodes within a specific area.¹ Typically, zones represent the vertical integrated utility territories.² See also: *Node* and *Hub*.

Local Sourcing Requirement – The portion of the total capacity requirement of the load in a capacity zone that must be purchased from resources within that zone after accounting for the capacity that can reliably be imported into that zone.⁴

Locational Based Marginal Pricing (LBMP) – See *Locational Marginal Price*.

Locational Imbalance Price (LIP) – The cost of bringing the last unit of the commodity – the one that balances supply and demand – to market. LIP recognizes that this marginal price may vary at different times and locations based on transmission loading.²⁶

²³ New York ISO. (2011). *Glossary*. Retrieved on October 25, 2011 from

http://www.nyiso.com/public/markets_operations/services/customer_support/glossary/index.jsp

²⁴ Potomac Economics. (2011). *2010 State of the Market Report for the ERCOT Wholesale Electricity Markets*, August 2011.

²⁵ North American Reliability Corporation. (2011). *Glossary of Terms Used in NERC Reliability Standards*. Retrieved on February 25, 2012 from http://www.nerc.com/files/Glossary_of_Terms_2011August4.pdf

²⁶ SPP. (2011). *Imbalance Pricing*. Retrieved on October 25, 2011 from <http://www.spp.org/publications/LIP/lmp/9.html>

Locational Marginal Price (Pricing) (LMP) – The calculated price of electric energy at a node, load zone, reliability region, and the hub.¹

Loop Flow – See *Parallel Path Flow*.

Loss of Opportunity Costs – A difference in net compensation from the energy market between what a unit receives when providing regulation or synchronized reserve and what it would have received for providing energy output.¹⁰

M

Maintenance Outage – The scheduled removal from service, in whole or in part, of a generating unit, transmission line, or other facility in order to perform necessary repairs on specific components of the facility.¹⁰ See also: *Forced Outage*, *Outage*, *Planned Outage* and *Scheduled Outage*.

Marginal Price/Marginal Cost – A price/cost (or increase in total price/cost) required to produce one additional unit of output.⁵

Marginal Unit – Marginal units are the generating units that set the locational marginal price.²⁷ Those are the last dispatched (the most expensive) units required to meet demand.²⁴ When there is congestion in the system, there can be more than one marginal unit.²⁷

Market-based Service – A service where a price for a product or service is based upon existing market conditions. The price is set by an agreement between a buyer and seller.²⁸

Market Clearing Price – The price in a market at which supply equals demand. All demand prepared to pay at least this price has been satisfied and all supply prepared to operate at or below this price has been purchased.¹⁴

Market Clearing Quantity – Intersection of the supply curve and demand curve.

Monitoring Analytics – PJM's independent market monitor. See also: *Independent Market Monitor*.

MWh – A megawatt produced or consumed for one hour. See also: *Units of Electricity*.

N

Nodal Price – The price for electric energy received or furnished at a node for any given hour.⁴ See also: *Hub Price* and *Zonal Price*.

Node (or Nodal) – A physical location on a transmission grid where electricity is delivered or withdrawn.² It is a point on the transmission system for which nodal prices are calculated.⁴ Node can designate one such location, or groups of such locations designated as hubs or zones.² See also: *Hub* and *Load Zone*.

North American Electric Reliability Corporation (NERC) – A non-profit organization that operates to improve the reliability and security of the bulk power system in North America; develops and enforces reliability standards; monitors the bulk power system; assesses future adequacy; audits owners, operators, and users for preparedness; and educates and trains industry personnel. As the Electric Reliability Organization, NERC is subject to audit by FERC and governmental authorities in Canada.²⁹

O

Open Access – Non-discriminating access to the transmission lines.

²⁷ Monitoring Analytics. (2013). Marginal Fuel Posting. Retrieved on January 12, 2013 from http://www.monitoringanalytics.com/data/marginal_fuel.shtml

²⁸ Business Dictionary. (2013). *Market-based Service*. Retrieved on January 10, 2013 from <http://www.businessdictionary.com/definition/market-based-pricing.html>

²⁹ North American Reliability Corporation. (2011). *About NERC*. Retrieved on October 25, 2011 from <http://www.nerc.com/page.php?cid=1>

Open Access Same-Time Information System (OASIS) – The electronic posting system for transmission access data that allows all market participants to view the data simultaneously.¹⁴

Operating Day – The daily 24-hour period beginning at midnight for which transactions on an energy market are scheduled.¹⁰

Operating Reserve – A capability above firm system demand required to balance shorter-term deviations between system load and generation, correct load forecasting errors, handle forced outages and recover from a contingency. It consists of spinning and non-spinning reserve.²³ See also: *Types of Reserves*.

Out-of-Merit Commitment or Out-of-Merit Capacity (OOMC) – A committed capacity required for system reliability requirements.²⁴

Out-of-Merit Dispatch or Out-of-Merit Energy – Energy provided by a resource selected outside the market bidding process to resolve a reliability or security event.⁷

Outage – The period during which a generating unit, transmission line, or other facility is out of service.¹⁴ See also: *Forced Outage, Maintenance Outage, Planned Outage and Scheduled Outage*,

Outage Coordination – A business processes used to schedule and approve maintenance outages.

P

Parallel Path Flow/Loop Flow – The unscheduled transmission flows that occur on adjoining transmission systems when power is transferred in an interconnected electrical system.²¹

Peak/ Peak Demand – The highest electric requirement occurring in a given period (e.g., an hour, a day, month, season or year). For an electric system, it is equal to the sum of the metered net outputs of all generators within a system and the metered line flows into the system, less the metered line flows out of the system.¹⁰

Planned Demand Resource – A demand resource that does not currently have the capability to provide a reduction in demand or to otherwise control load, but that is scheduled to be capable of providing a reduction or control, on or before the start of the delivery year for which the resource is to be committed.³

Planned Generation Capacity Resource – A generation capacity resource participating in the generation interconnection process for which Interconnection Service is scheduled to commence on or before the first day of the delivery year for which the resource is to be committed.

Planned Generator Outage – See *Planned Outage*.

Planned Outage – The scheduled removal from service, in whole or in part, of a generating unit for inspection, maintenance or repair.¹⁴ See also: *Forced Outage, Maintenance Outage, Outage and Scheduled Outage*.

Planner – A person who works with stakeholders to develop overall plans for new transmission needed to meet future projected electricity demand.¹

Planning Reserve – An adequate reserve margin that is essential for maintaining bulk power system reliability by providing system operators with the flexibility needed to withstand unexpected generation or transmission outages and deviations from the demand forecast.³⁴

Potomac Economics – An independent market monitor for the Midwest ISO, ERCOT, New York ISO and ISO New England.^{7,24} See also: *Independent Market Monitor*.

Power – See *Electric Power*.

Power Generator – See *Generator*.

Power Market – A place to buy and sell electricity.⁴ See also: *Electricity Market, Energy Market and Wholesale Electric Energy Market*.

Power Marketing Administration/Authorities (PMA) – Federally-chartered entities that own power generation facilities (typically hydropower plants), and can own transmission assets. PMAs typically sell power to cooperative-owned utilities or municipally-owned utilities, but can also sell to investor-owned utilities or federal agencies. There are four PMAs across the U.S.: the Bonneville Power Administration, the Southwestern Power Administration, the Southeastern Power Administration, and the Western Area Power Administration.³⁰

Power Pool – An association of two or more interconnected electric systems having an agreement to coordinate operations and planning for improved reliability and efficiencies.¹⁴

Power System – The elements of an electrical system, including generation units, transmission lines, distribution lines, substations, and other equipment.⁴ See also: *Bulk Power System*.

Power System Stabilizers – A device that is installed on generation resources to maintain synchronous operation of the power system under transient conditions such as loss of transmission lines due to overloading or weather conditions, loss of a generator, or the loss of major load.³

Price Cap – The maximum wholesale electricity price that can be received/paid by market participants.

Price Signal – A message sent to customers in the form of a price charged for electricity; usually indicates a message intended to produce a particular result. As an example, increasing prices during periods of shortage is a price signal to customers to cut back on energy consumption during these periods.³¹

Price Volatility Make-Whole Payments – Provides assurances to suppliers that they will not be financially harmed by responding to prices and following dispatch signals.¹¹

Public Utility Commission (PUC)/Public Service Commission (PSC) – A state level governing body that regulates the rates and services of a utility (e.g., electric, natural gas, telecommunication, water, transportation).

Publicly Owned Utility – A utility operated by a municipality to serve residents or by a cooperative to serve its members. Municipally owned utilities do not necessarily serve all customers within the city limits and sometimes serve customers outside their boundaries. Cooperative utilities, which are owned and operated by and for their members, frequently are located in rural areas.

R

Reactive Power – A quantity that is only defined for alternating current electric systems. The product of voltage and the out-of-phase component of alternating current. Reactive power, usually measured in MVAR, is produced by capacitors and similar devices and is absorbed by inductors and similar devices.⁴ Reactive power is used to compensate for voltage drops and it is typically provided closer to the load. See also: *Capacitor* and *Inductor*.

Real-Time Market – A market in which prices for energy delivery are calculated for immediate delivery, typically in five-minute increments, based on current operating conditions of supply and demand. See also: *Spot Market*.

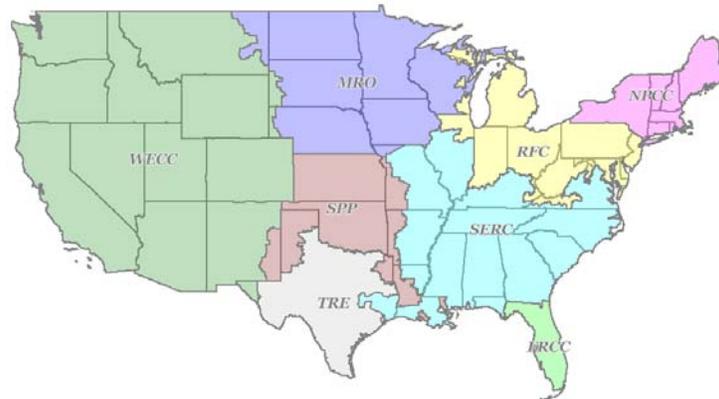
Real-Time Market Administrator – Administers a market where electricity is bought and sold at prices determined in real time to satisfy the difference between projected needs and actual demand. Many of the markets price electricity differently at various locations across the region in order to reflect the costs associated with congestion.¹

³⁰ U.S. Department of Energy. (2011). *Power Marketing Administration*. Retrieved on October 25, 2011 from <http://energy.gov/offices>

³¹ EnergyVortex. (2011). *Energy Dictionary – Price Signal*. Retrieved on October 25, 2011 from http://www.energyvortex.com/energydictionary/price_signal.html

Reconfiguration Auction – An auction of the Forward Capacity Market whereby capacity supply obligations are traded monthly, seasonally, and annually to clear supply offers and demand bids for each capacity zone.¹ Also referred to as an incremental auction in PJM. See also: *Incremental Auction*.

Regional Entity – An entity that has responsibility to enforce NERC’s and the regional reliability standards, and perform other standards-related functions assigned by NERC.³² NERC works with eight regional entities: Florida Reliability Coordinating Council (FRCC), Midwest Reliability Organization (MRO), Northeast Power Coordinating Council (NPCC), ReliabilityFirst Corporation (RFC), SERC Reliability Corporation (SERC), Southwest Power Pool Regional Entity (SPP), Texas Reliability Entity (TRE) and Western Electricity Coordinating Council (WECC).



Map developed by NETL. Source: ABB Velocity Suite

Regional Grid Operator – See *Regional Transmission Organization* and *Independent System Operator*.

Regional Reliability Organizations – An entity that ensures that a defined area of the bulk electric system is reliable, adequate and secure.²⁵ See also: *Regional Entity*.

Regional Transmission Organization (RTO) – An RTO is typically responsible for managing the operations of a transmission grid in a particular geographic area, and can also facilitate markets including the purchase and sale of wholesale power. RTO formation was encouraged by FERC Order 2000, and requires the organization to satisfy twelve characteristics and functions to be certified by FERC as the RTO. RTOs include: ISO New England, PJM, Midwest ISO and Southwest Power Pool. See also: *Independent System Operator (ISO)*, *FERC Order 888/889* and *FERC Order 2000*.

Regulated Industry (Utility) – An industry that provides electricity within a designated franchised service area. This includes investor-owned electric utilities that are subject to rate regulation, municipal utilities, federal and state power authorities, and rural electric cooperatives.¹⁴ See also: *Utility* and *Vertically Integrated Utility*.

Regulation – See *Frequency Regulation*.

Regulation Down – An ancillary service that provides capacity decrease as a response to signals from a system operator within three to five seconds to respond to changes in system frequency.³ See also: *Frequency Regulation*.

Regulation Market Clearing Price – The shadow price of supplying the last MW of regulation needed in the area, thus satisfying its regulation requirement constraint. The shadow price is obtained through a simultaneous co-optimization of Regulation, Synchronized Reserve, and Energy to minimize overall production cost. The co-optimized result ranks all available regulating resources in ascending merit order

³² North American Reliability Corporation. (2011). *Company Overview: FAQ*. Retrieved on October 25, 2011 from <http://www.nerc.com/page.php?cid=1%7C7%7C114>

price, where merit order is the offer plus lost opportunity cost, simultaneously determining the least expensive set of resources necessary to provide regulation and synchronized reserve for the operating hour while taking into account any resources self-scheduled to provide any of these services.³ See also: *Shadow Price*.

Regulation Up – An ancillary service that provides capacity increase as a response to signals from a system operator within three to five seconds to respond to changes in system frequency.³ See also: *Frequency Regulation*.

Reliability – The assurance that power is available even under adverse conditions, such as unplanned outages of generation or transmission lines.¹

Reliability Coordinator – A coordinator that ensures the real-time operating reliability of the transmission system.¹ There are 15 Reliability Coordinators in the US and Canada.

Reliability Must Run Contract – A contract with a generation resource that would not otherwise be operated except that it is necessary to provide voltage support, stability, or management of localized transmission constraints.⁷

Reliability Pricing Model – PJM’s capacity market. See also: *Capacity Market*.

Reliability Standards – A requirement approved by FERC under Section 215 of the Federal Power Act to provide for reliable operation of the bulk power system. The term does not include any requirement to enlarge such facilities or to construct new transmission capacity or generation capacity.¹⁴ A reliability standard that is applicable to a specific region is called regional reliability standard.

Renewable Portfolio Standards (RPS) – A mechanism to increase renewable energy generation. An RPS requires electric utilities and other retail electric providers to supply a specified minimum amount of customer load with electricity from eligible renewable energy sources. Currently, states with RPS requirements/laws mandate that between 4 and 33 percent of electricity be generated from renewable sources by a specified date.³³

Reserve Margin – A reserve that is roughly calculated as capacity minus demand, divided by demand.³⁴

Reserve Requirement /Reserve Obligation – A predefined capacity that currently is not being used but that can be quickly available for the unexpected loss of generation.¹⁰ See also: *Types of Reserves*.

Resource – Any source of electric energy that increases the availability of capacity (in megawatt), such as a generator, a dispatchable load, a demand-response resource, or an electricity import or external transaction.⁴

Resource Adequacy – The ability of a bulk electric power system to supply the aggregate electrical demand and energy requirements (i.e., the electrical loads of all the customers at all times plus external transaction sales to other control areas), taking into account scheduled and reasonably expected unscheduled outages of system devices (e.g., generators, transformers, circuits, circuit breakers, or bus sections).¹

Restructured Electric Industry – An industry where the monopoly system of electric utilities has been replaced with competing sellers.¹⁴

Restructuring – The process of replacing a monopolistic system of electric utility suppliers with competing sellers, allowing individual retail customers to choose their supplier but still receive delivery

³³ EPA. (2011). *Renewable Portfolio Standard Fact Sheet*. Retrieved on October 25, 2011 from http://www.epa.gov/chp/state-policy/renewable_fs.html

³⁴ North American Reliability Corporation. (2011). *2011 Summer Reliability Assessments*. Retrieved on October 25, 2011 from http://www.nerc.com/files/2011%20Summer%20Reliability%20Assessment_FINAL.pdf

over the power lines of the local utility. It includes the reconfiguration of vertically-integrated electric utilities.¹⁴

Retail Electric Market – A market where end-users can choose their supplier from competing retail electric providers.

Retail Electric Provider (REP)/Supplier – An entity that sells electric energy to retail customers but does not own or operate generation assets and is not a municipally-owned utility or an electric cooperative.⁷

Retail Rate – The price of electricity that end-users are paying.

Revenue Sufficiency Guarantee – Payments that ensure that the total market revenue a generator receives when its offer is accepted is at least equal to its as-offered costs.¹¹

S

Schedule – A set of MWh values consisting of one value for each hour of a single day.³

Scheduled Outage – The shutdown of a generating unit, transmission line, or other facility for inspection or maintenance, in accordance with an advance schedule.¹⁴ See also: *Forced Outage*, *Maintenance Outage*, *Outage* and *Planned Outage*.

Scheduling – A process through which schedules for energy and Ancillary Services are submitted by market participants to a RTO/ISO. It also includes the MW of Energy of Generation and Demand cleared through the market clearing process set in the Day-Ahead Schedule for the next Trading Day.^{7, 14}

Shadow Price – The cost sensitivity of the relevant binding regional constraint at the optimal solution, i.e., the marginal reduction of the combined Energy and Ancillary Services procurement cost associated with a marginal relaxation of that constraint.¹⁴ Shadow price is applicable to any market where constraints exist. See also: *Ancillary Service Shadow Price* and *Regulation Market Clearing Price*.

Service Area – An area in which an electric utility is obligated to provide electric service to end-use customers.¹⁴

Special Protection System – An automatic protection system designed to detect abnormal or predetermined system conditions, and take corrective actions other than and/or in addition to the isolation of faulted components to maintain system reliability.²⁵

Spot Market – A market that typically involves short-term, often interruptible contracting and immediate delivery of specified volumes of electric energy, as opposed to bilateral trading.¹ See also: *Real Time Market*.

Supply – Electricity delivered to the system.⁴ See also: *Generation*.

Supply Curve – A graph showing the hypothetical supply of a product or service that would be available at different price points.³⁵ See also: *Demand Curve*.

Synchronous Condensers – A unit that is only capable of supplying reactive power that would not otherwise be operated except that it is necessary to provide voltage support.³

System Contingency – See *Contingency*.

System Disturbance – An unplanned event that produces an abnormal system condition; any perturbation to the electric system. Also, the unexpected change in the area control error caused by the sudden failure of generation or an interruption of load.⁴

³⁵ Investor Words. (2013). *Supply Curve*. Retrieved on October 25, 2011 from http://www.investorwords.com/5812/supply_curve.html

System Operator – An individual at an electric system control center whose responsibility it is to monitor and control that electric system in real time.¹⁰ A system operator can also be an entity responsible for the reliability and operation of its "local" transmission system.⁴ The entity is charged with coordination of market transactions, system-wide transmission planning, and network reliability.³ See also: *Independent System Operator (ISO)*.

System Protection – A set of actions that protect bulk power systems from faults through the isolation of faulted parts from the rest of the system.

System Restoration – Restoring supply to the bulk power system following a major disturbance, outage or blackout.

T

Tariff – The rates and pricing schedule for electricity, as well as the terms of service, including reliability standards approved by the state or federal regulatory organization.

Transmission Capability – The overall capacity of interregional or international power lines, together with the associated electrical system facilities, to transfer power and energy from one electrical system to another.¹⁴

Transmission Congestion – See *Congestion*.

Transmission Congestion Contracts (TCC) – The right to collect or obligation to pay Congestion Rents associated with a single MW of transmission between a specified point of injection and point of withdrawal. TCCs are financial instruments that enable energy buyers and sellers to hedge fluctuations in the price of transmission. It is used in NYISO.²³ See also: *Congestion Revenue Right* and *Financial Transmission Rights*.

Transmission Constraints – A limitation on one or more transmission elements that may be reached during normal or contingency system operations.²⁵

Transmission Line Capacity – Maximum amount of power that can be sent over a transmission line.

Transmission Owner – The entity that owns and maintains transmission facilities.²⁵

Transmission Right – See *Financial Transmission Right*.

Transmission Service – The right to use high-voltage transmission lines to transfer power from a generator to a consumer.⁸

Transmission Service Charges – Payments to transmission asset owners based on the utilization of the owner's transmission lines.

Transmission Service Provider – Administers the transmission tariff and provides transmission services, receives and processes transmission service requests, and determines available capacity.¹

Transmission System / Transmission Grid – An interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems.²⁵

Types of Reserves – *Operating Reserve* – Generation available in 30 minutes. *Synchronized or Spinning Reserve* – Reserve capability that can be converted fully into energy within 10 minutes or customer load that can be removed from the system within 10 minutes of the request from the dispatcher, and must be provided by equipment electrically synchronized to the system. *Non-Synchronized* – reserve available in 10 minutes that is not synchronized with the system. *Secondary Reserve* – Reserve available in 10 to 30 minutes.³

U

Unit Commitment – The process of determining which generating units will be committed (started) to meet demand and provide ancillary services in the near future (e.g., the next trading day).¹⁴

Units of Electricity – Real power is measured in watt (W) or kilowatt (kW; 1kW = 1,000 W) or megawatt (MW; 1MW = 1,000 kW = 1,000,000 W). Reactive power is measured in mega-volt-ampere reactive (MVAR), energy is measured in watt-hour (Wh) or kilowatt-hour (kWh; 1kWh = 1,000Wh) or megawatt-hour (MWh; 1MWh = 1,000 kWh = 1,000,000 Wh) and apparent power in megavolt-ampere (MVA). See also: *Electric Power*.

Uplift – A variety of non-market-based expenses such as out-of-merit energy dispatch, out-of-merit commitment, replacement reserve services, reliability must run contracts, price volatility make-whole payments, and revenue sufficiency guarantees.¹¹

Utility – A corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for the generation, transmission, distribution, or sale of electric energy primarily for use by the public and is defined as a utility under the statutes and rules by which it is regulated. Types of electric utilities include investor owned, cooperatively owned, and government owned (federal agency, state, provincials, municipals, and public power districts).¹⁰ See also: *Investor-Owned Utility*, *Publicly Owned Utility* and *Federal Power Agencies*.

V

Vertically Integrated Utility – A single company that owns and manages the power generating facilities, transmission and distribution lines, and retail sale of power.³⁶ See also: *Utility* and *Regulated Utility*.

Voltage Control – The control of transmission voltage through adjustments in generator reactive output and transformer taps, and by switching capacitors and inductors on the transmission and distribution systems.¹⁰

Voltage Management – See *Voltage Control*.

Voltage Support – Services provided by generating units or other equipment such as shunt capacitors, static VAR compensators, or synchronous condensers that are required to maintain established grid voltage criteria. This service is required under normal or system emergency conditions.¹⁴

W

Wholesale (Electric Energy, Power) Market – The buying, selling, and reselling of the electric energy generated by a bulk power system to meet the system's demand for electric energy.⁴ See also: *Electricity Market*, *Energy Market* and *Power Market*.

Wholesale Market Price – The price in a market at which supply equals demand. All demand prepared to pay at least this price has been satisfied and all supply prepared to operate at or below this price has been purchased.¹⁴

Z

Zonal Price – The hourly price for electric energy received in a defined load zone calculated using a load-weighted average of the locational marginal prices for the nodes within the load zone.¹ See also: *Nodal Price* and *Hub Price*.

Zone – See *Load Zone*.

³⁶ Willis, H.L., and Philipson, L., 2005. *Understanding Electric Utilities and Deregulation*, 2nd ed., Boca Raton, FL: CRC Press.