Glossary of Terms

Prepared by the Glossary of Terms Task Force
North American Electric Reliability Council

August 1996

INTRODUCTION

The NERC Engineering Committee (EC) and Operating Committee (OC) jointly formed the Glossary of Terms Task Force (GOTTF) to develop a glossary to serve the needs of the electrical industry. This *Glossary of Terms* was approved by both the EC and OC on July 16, 1996.

This *Glossary of Terms* provides a list of terms and their definitions describing various aspects of interconnected electric systems planning and operation from a reliability perspective. All parties using or having interest in the interconnected electric systems in North America are encouraged to use this glossary to provide consistency in terminology and to improve understanding and communications about electric system planning and operations.

Glossary of Terms — August 1996

Access — The contracted right to use an electrical system to transfer electrical energy.

Adequacy — See Reliability.

Adjacent System or Adjacent Control Area — Any system or Control Area either directly interconnected with or electrically close to (so as to be significantly affected by the existence of) another system or Control Area.

Ancillary Services — Interconnected Operations Services identified by the U.S. Federal Energy Regulatory Commission (Order No. 888 issued April 24, 1996) as necessary to effect a transfer of electricity between purchasing and selling entities and which a transmission provider must include in an open access transmission tariff. See also Interconnected Operations Services.

Energy Imbalance Service — Provides energy correction for any hourly mismatch between a transmission customer's energy supply and the demand served.

Operating Reserve: Spinning Reserve Service — Provides additional capacity from electricity generators that are on-line, loaded to less than their maximum output, and available to serve customer demand immediately should a contingency occur.

Operating Reserve: Supplemental Reserve Service — Provides additional capacity from electricity generators that can be used to respond to a contingency within a short period, usually ten minutes.

Reactive Supply and Voltage Control From Generating Sources Service — Provides reactive supply through changes to generator reactive output to maintain transmission line voltage and facilitate electricity transfers.

Regulation and Frequency Response Service — Provides for following the moment-to-moment variations in the demand or supply in a Control Area and maintaining scheduled Interconnection frequency.

Scheduling, System Control, and Dispatch Service — Provides for a) scheduling, b) confirming and implementing an interchange schedule with other Control Areas, including intermediary Control Areas providing transmission service, and c) ensuring operational security during the interchange transaction.

Area Control Error — The instantaneous difference between actual and scheduled interchange, taking into account the effects of frequency bias.

Automatic Generation Control (AGC) — Equipment that automatically adjusts a Control Area's generation to maintain its interchange schedule plus its share of frequency regulation.

The following AGC modes are typically available:

a. Tie Line Bias Control — Automatic generation control with both frequency and interchange terms of Area Control Error considered.

b. Constant Frequency (Flat Frequency) Control — Automatic generation control with the interchange term of Area Control Error ignored. This Automatic Generation Control mode attempts to maintain the desired frequency without regard to interchange.

c. Constant Net Interchange (Flat Tie Line) Control — Automatic generation control with the frequency term of Area Control Error ignored. This Automatic Generation Control mode attempts to maintain interchange at the desired level without regard to frequency.

Availability — A measure of time a generating unit, transmission line, or other facility is capable of providing service, whether or not it actually is in service. Typically, this measure is expressed as a percent available for the period under consideration.

Available Resource — The sum of existing generating capacity, plus new units scheduled for service, plus the net of equivalent firm capacity purchases and sales, less existing capacity unavailable due to planned outages.

Available Transfer Capability (ATC) — A measure of the transfer capability remaining in the physical transmission network for further commercial activity over and above already committed uses. ATC is defined as the Total Transfer Capability (TTC), less the Transmission Reliability Margin (TRM), less the sum of existing transmission commitments (which includes retail customer service) and the Capacity Benefit Margin (CBM).

Nonrecallable Available Transfer Capability (NATC) — Total Transmission Capability less the Transmission Reliability Margin, less nonrecallable reserved transmission service (including the Capacity Benefit Margin).

Recallable Available Transmission Capability (RATC) — Total Transmission Capability less the Transmission Reliability Margin, less recallable transmission service, less non-recallable transmission service (including the Capacity Benefit Margin). RATC must be considered differently in the planning and operating horizons. In the planning horizon, the only data

available are recallable and nonrecallable transmission service reservations, whereas in the operating horizon transmission schedules are known.

Backup Power — Power provided by contract to a customer when that customer's normal source of power is not available.

Backup Supply Service — See Interconnected Operations Services.

Banking — Energy delivered or received by a utility with the intent that it will be returned in kind in the future. See Storage, Energy Exchange.

Baseload — The minimum amount of electric power delivered or required over a given period at a constant rate.

Blackstart Capability — The ability of a generating unit or station to go from a shutdown condition to an operating condition and start delivering power without assistance from the electric system.

Broker — A third party who establishes a transaction between a seller and a purchaser. A Broker does not take title to capacity or energy.

Bulk Electric System — A term commonly applied to the portion of an electric utility system that encompasses the electrical generation resources and bulk transmission system.

Capacity — The rated continuous load-carrying ability, expressed in megawatts (MW) or megavolt-amperes (MVA) of generation, transmission, or other electrical equipment.

Baseload Capacity — Capacity used to serve an essentially constant level of customer demand. Baseload generating units typically operate whenever they are available, and they generally have a capacity factor that is above 60%.

Peaking Capacity — Capacity used to serve peak demand. Peaking generating units operate a limited number of hours per year, and their capacity factor is normally less than 20%.

Net Capacity — The maximum capacity (or effective rating), modified for ambient limitations, that a generating unit, power plant, or electric system can sustain over a specified period, less the capacity used to supply the demand of station service or auxiliary needs.

Intermediate Capacity — Capacity intended to operate fewer hours per year than baseload capacity but more than peaking capacity. Typically, such generating units have a capacity factor of 20% to 60%.

Firm Capacity — Capacity that is as firm as the seller's native load unless modified by contract. Associated energy may or may not be taken at option of purchaser. Supporting reserve is carried by the seller.

Capacity Benefit Margin (CBM) — That amount of transmission transfer capability reserved by load serving entities to ensure access to generation from interconnected systems to meet generation reliability requirements. Reservation of CBM by a load serving entity allows that entity to reduce its installed generating capacity below that which may otherwise have been necessary without interconnections to meet its generation reliability requirements. See Available Transfer Capability.

Capacity Emergency — A state when a system's or pool's operating capacity plus firm purchases from other systems, to the extent available or limited by transfer capability, is inadequate to meet the total of its demand, firm sales, and regulating requirements. See Energy Emergency.

Capacity Factor — The ratio of the total energy generated by a generating unit for a specified period to the maximum possible energy it could have generated if operated at the maximum capacity rating for the same specified period, expressed as a percent.

Cascading — The uncontrolled successive loss of system elements triggered by an incident at any location. Cascading results in widespread service interruption, which cannot be restrained from sequentially spreading beyond an area predetermined by appropriate studies.

Cogeneration — Production of electricity from steam, heat, or other forms of energy produced as a by-product of another process.

Combined Cycle — An electric generating technology in which electricity and process steam is produced from otherwise lost waste heat exiting from one or more combustion turbines. The exiting heat is routed to a conventional boiler or to a heat recovery steam generator for use by a steam turbine in the production of electricity. This process increases the efficiency of the electric generating unit.

Commercial Information — Information that can be used in the marketplace.

Commonly Owned Unit — A generating unit whose capacity is owned or leased and divided among two or more entities. Synonym: Jointly Owned Unit.

Contingency — The unexpected failure or outage of a system component, such as a generator, transmission line, circuit breaker, switch, or other electrical element. A contingency also

may include multiple components, which are related by situations leading to simultaneous component outages.

Limiting Critical Contingency — See Element.

Contract Path — A specific contiguous electrical path from a Point of Receipt to a Point of Delivery for which transfer rights have been contracted.

Control Area — An electric system or systems, bounded by interconnection metering and telemetry, capable of controlling generation to maintain its interchange schedule with other Control Areas and contributing to frequency regulation of the Interconnection.

Curtailability — The right of a transmission provider to interrupt all or part of a transmission service due to constraints that reduce the capability of the transmission network to provide that transmission service. Transmission service is to be curtailed only in cases where system reliability is threatened or emergency conditions exist.

Curtailment — A reduction in the scheduled capacity or energy delivery.

Demand — The rate at which electric energy is delivered to or by a system or part of a system, generally expressed in kilowatts or megawatts, at a given instant or averaged over any designated interval of time. Demand should not be confused with Load. Types of Demand include:

Instantaneous Demand — The rate of energy delivered at a given instant.

Average Demand — The electric energy delivered over any interval of time as determined by dividing the total energy by the units of time in the interval.

Integrated Demand — The average of the instantaneous demands over the demand interval.

Demand Interval — The time period during which electric energy is measured, usually in 15-, 30-, or 60-minute increments.

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.

Coincident Demand — The sum of two or more demands that occur in the same demand interval.

Noncoincident Demand — The sum of two or more demands that occur in different demand intervals.

Contract Demand — The amount of capacity that a supplier agrees to make available for delivery to a particular entity and which the entity agrees to purchase.

Firm Demand — That portion of the Contract Demand that a power supplier is obligated to provide except when system reliability is threatened or during emergency conditions.

Billing Demand — The demand upon which customer billing is based as specified in a rate schedule or contract. It may be based on the contract year, a contract minimum, or a previous maximum and, therefore, does not necessarily coincide with the actual measured demand of the billing period.

Demand-Side Management — The term for all activities or programs undertaken by an electric system or its customers to influence the amount or timing of electricity use.

Indirect Demand-Side Management — Programs such as conservation, improvements in efficiency of electrical energy use, rate incentives, rebates, and other similar activities to influence electricity use.

Direct Control Load Management — The customer demand that can be interrupted by direct control of the system operator controlling the electric supply to individual appliances or equipment on customer premises. This type of control, when used by utilities, usually involves residential customers. Direct Control Load Management as defined here does not include Interruptible Demand.

Interruptible Demand — The magnitude of customer demand that, in accordance with contractual arrangements, can be interrupted by direct control of the system operator or by action of the customer at the direct request of the system operator. In some instances, the demand reduction may be initiated by the direct action of the system operator (remote tripping) with or without notice to the customer in accordance with contractual provisions. Interruptible Demand as defined here does not include Direct Control Load Management.

Derating (Generator) — A reduction in a generating unit's Net Dependable Capacity.

Forced Derating — An unplanned component failure (immediate, delayed, postponed) or other condition that requires the output of the unit be reduced immediately or before the next weekend.

Maintenance Derating — The removal of a component for scheduled repairs that can be deferred beyond the end of the next weekend, but requires a reduction of capacity before the next planned outage.

Planned Derating — The removal of a component for repairs that is scheduled well in advance and has a predetermined duration.

Scheduled Derating — A combination of maintenance and planned deratings.

Dispatchable Generation — Generation available physically or contractually to respond to changes in system demand or to respond to transmission security constraints. See Must-Run Generation.

Disturbance — An unplanned event that produces an abnormal system condition.

Dynamic Rating — The process that allows a system element rating to vary with the changing environmental conditions in which the element is located.

Diversity Factor — The ratio of the sum of the coincident maximum demands of two or more loads to their noncoincident maximum demand for the same period.

Dynamic Schedule — A telemetered reading or value that is updated in real time and used as a schedule in the Automatic Generation Control/Area Control Error equation and the integrated value of which is treated as a schedule. Commonly used for "scheduling" commonly owned generation or remote load to or from another Control Area.

Dynamic Scheduling Service — See Interconnected Operations Services.

Economic Dispatch — The allocation of demand to individual generating units on line to effect the most economical production of electricity.

Electrical Energy — The generation or use of electric power by a device over a period of time, expressed in kilowatthours (kWh), megawatthours (MWh), or gigawatthours (GWh).

Firm Energy — Electrical Energy backed by capacity, interruptible only on conditions as agreed upon by contract, system reliability constraints, or emergency conditions and where the supporting reserve is supplied by the seller.

Nonfirm Energy — Electrical Energy that may be interrupted by either the provider or the receiver of the energy by giving advance notice to the other party to the transaction. This advance notice period is equal to or greater than the minimum period agreed to in the

contract. Nonfirm Energy may also be interrupted to maintain system reliability of third-party Transmission Providers. Nonfirm Energy must be backed up by reserves.

Emergency Energy — Electrical Energy purchased by a member system whenever an event on that system causes insufficient Operating Capability to cover its own demand requirement.

Economy Energy — Electrical Energy produced and supplied from a more economical source in one system and substituted for that being produced or capable of being produced by a less economical source in another system.

Off-Peak Energy — Electrical Energy supplied during a period of relatively low system demands as specified by the supplier.

On-Peak Energy — Electrical Energy supplied during a period of relatively high system demands as specified by the supplier.

Electric System Losses — Total electric energy losses in the electric system. The losses consist of transmission, transformation, and distribution losses between supply sources and delivery points. Electric energy is lost primarily due to heating of transmission and distribution elements.

Electric 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, crown corporation, state, provincials, municipals, and public power districts).

Element — Any electric device with terminals that may be connected to other electric devices, such as a generator, transformer, circuit, circuit breaker, or bus section. See Rating, System Element Rating.

Limiting Element — The element that is either operating at its appropriate rating or would be following the limiting contingency and, as a result, establishes a system limit.

Emergency — Any abnormal system condition that requires automatic or immediate manual action to prevent or limit loss of transmission facilities or generation supply that could adversely affect the reliability of the electric system.

Energy Emergency — A condition when a system or power pool does not have adequate energy resources (including water for hydro units) to provide its customers' expected energy requirement. See Capacity Emergency.

Energy Exchange — Transaction whereby the receiver accepts delivery of energy for a supplier's account and returns energy later at times, rates, and in amounts as mutually agreed. See Storage, Banking.

Energy Imbalance Service — See Ancillary Services.

Expected Unserved Energy — The expected amount of energy curtailment per year due to demand exceeding available capacity. It is usually expressed in megawatthours (MWh).

Fault — An event occurring on an electric system such as a short circuit, a broken wire, or an intermittent connection.

Forecast — Predicted demand for electric power. A forecast may be short term (e.g., 15 minutes) for system operation purposes, long-term (e.g., five to 20 years) for generation planning purposes, or for any range in between. A forecast may include peak demand, energy, reactive power, or demand profile. A forecast may be made for total system demand, transmission loading, substation/feeder loading, individual customer demand, or appliance demand.

Forecast Uncertainty — Probable deviations from the expected values of factors considered in a forecast.

Frequency

Frequency Bias — A value, usually given in megawatts per 0.1 Hertz (MW/0.1 Hz), associated with a Control Area that relates the difference between scheduled and actual frequency to the amount of generation required to correct the difference.

Frequency Deviation — A departure from scheduled frequency.

Frequency Error — The difference between actual system frequency and the scheduled system frequency.

Frequency Regulation — The ability of a Control Area to assist the interconnected system in maintaining scheduled frequency. This assistance can include both turbine governor response and automatic generation control.

Frequency Response (Equipment) — The ability of a system or elements of the system to react or respond to a change in system frequency.

Frequency Response (System) — The sum of the change in demand, plus the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 Hertz (MW/0.1 Hz).

Scheduled Frequency — 60.0 Hertz, except during a time correction.

Generation (Electricity) — The process of producing electrical energy from other forms of energy; also, the amount of electric energy produced, usually expressed in kilowatthours (kWh) or megawatthours (MWh).

Generation, Gross — The electrical output at the terminals of the generator, usually expressed in megawatts (MW).

Generation, Net — Gross generation minus station service or unit service power requirements, usually expressed in megawatts (MW).

Host Control Area (HCA) — 1. A Control Area that confirms and implements scheduled Interchange for a Transmission Customer that operates generation or serves customers directly within the Control Area's metered boundaries. 2. The Control Area within whose metered boundaries a commonly owned unit or terminal is physically located.

Imbalance — A condition where the generation and interchange schedules do not match demand.

Inadvertent Energy Balancing — A Control Area's accounting of its inadvertent interchange, which is the accumulated difference between actual and scheduled interchange.

Inadvertent Interchange or Inadvertent — The difference between a Control Area's net actual interchange and net scheduled interchange.

Incremental Energy Cost — The additional cost that would be incurred by producing or purchasing the next available unit of electrical energy above the current base cost.

Incremental Heat Rate — The amount of additional heat that must be added to a thermal generating unit at a given loading to produce an additional unit of output. It is usually expressed in British thermal units per kilowatt hour (Btu/kWh) of output.

Independent Power Producers (IPP) — As used in NERC reference documents and reports, any entity that owns or operates an electricity generating facility that is not included in an

electric utility's rate base. This term includes, but is not limited to, cogenerators and small power producers and all other nonutility electricity producers, such as exempt wholesale generators who sell electricity.

Interchange — Electric power or energy that flows from one entity to another.

Actual Interchange — Metered electric power that flows from one entity to another.

Interchange Scheduling — The actions taken by scheduling entities to arrange transfer of electric power. The schedule consists of an agreement on the amount, start and end times, ramp rate, and degree of firmness.

Scheduled Interchange — Electric power scheduled to flow between entities, usually the net of all sales, purchases, and wheeling transactions between those areas at a given time.

Interconnected Operations Services (IOS) — Services that transmission providers may offer voluntarily to a transmission customer under Federal Energy Regulatory Commission Order No. 888 in addition to Ancillary Services. See also Ancillary Services.

Backup Supply Service — Provides capacity and energy to a transmission customer, as needed, to replace the loss of its generation sources and to cover that portion of demand that exceeds the generation supply for more than a short time.

Dynamic Scheduling Service — Provides the metering, telemetering, computer software, hardware, communications, engineering, and administration required to *electronically* move a transmission customer's generation or demand out of the Control Area to which it is physically connected and into a different Control Area.

Real Power Loss Service — Compensates for losses incurred by the Host Control Area(s) as a result of the interchange transaction for a transmission customer. Federal Energy Regulatory Commission's Order No. 888 requires that the transmission customer's service agreement with the Transmission Provider identify the entity responsible for supplying real power loss.

Restoration Service — Provides an offsite source of power to enable a Host Control Area to restore its system and a transmission customer to start its generating units or restore service to its customers if local power is not available.

Interconnected System — A system consisting of two or more individual electric systems that normally operate in synchronism and have connecting tie lines.

Interconnection — When capitalized, any one of the five major electric system networks in North America: Eastern, Western, ERCOT, Québec, and Alaska. When not capitalized, the facilities that connect two systems or Control Areas. Additionally, an interconnection refers to the facilities that connect a nonutility generator to a Control Area or system.

Interface — The specific set of transmission elements between two areas or between two areas comprising one or more electrical systems.

Intermediary Control Area — A Control Area that has connecting facilities in the scheduling path between the sending and receiving Control Areas and has operating agreements that establish the conditions for the use of such facilities.

Intra-Control Area Transaction — A transaction from one or more generating sources to one or more delivery points where all the sources and delivery points are entirely within the metered boundaries of the same Control Area.

Island — A portion of a power system or several power systems that is electrically separated from the interconnection due to the disconnection of transmission system elements.

Joint Unit Control — Automatic generation control of a generating unit by two or more entities.

Lambda — A term commonly given to the incremental cost that solves the economic dispatch calculation. It represents the cost of the next kilowatt hour that could be produced from dispatchable units on the system.

Load — An end-use device or customer that receives power from the electric system. Load should not be confused with Demand, which is the measure of power that a load receives or requires. See Demand.

Load Cycle — The normal pattern of demand over a specified time period associated with a device or circuit.

Load Duration Curve — A nonchronological, graphical summary of demand levels with corresponding time durations using a curve, which plots demand magnitude (power) on one axis and percent of time that the magnitude occurs on the other axis.

Load Factor — A measure of the degree of uniformity of demand over a period of time, usually one year, equivalent to the ratio of average demand to peak demand expressed as a percentage. It is calculated by dividing the total energy provided by a system during the period by the product of the peak demand during the period and the number of hours in the period.

Load Following — An electric system's process of regulating its generation to follow the changes in its customers' demand.

Load Shedding — The process of deliberately removing (either manually or automatically) preselected customer demand from a power system in response to an abnormal condition to maintain the integrity of the system and minimize overall customer outages.

Load Shifting — Demand-side management programs designed to encourage consumers to move their use of electricity from on-peak times to off-peak times.

Loop Flows — See Parallel Path Flows.

Loss of Load Expectation (LOLE) — The expected number of days in the year when the daily peak demand exceeds the available generating capacity. It is obtained by calculating the probability of daily peak demand exceeding the available capacity for each day and adding these probabilities for all the days in the year. The index is referred to as Hourly Loss-of-Load-Expectation if hourly demands are used in the calculations instead of daily peak demands. LOLE also is commonly referred to as Loss-of-Load-Probability. See Expected Unserved Energy.

Margin — The difference between net capacity resources and net internal demand. Margin is usually expressed in megawatts (MW).

Adequate Regulating Margin — The minimum on-line capacity that can be increased or decreased to allow the electric system to respond to all reasonable instantaneous demand changes to be in compliance with the Control Performance Criteria.

Available Margin — The difference between Available Resources and Net Internal Demand, expressed as a percent of Available Resources. This is the capacity available to cover random factors such as forced outages of generating equipment, demand forecast errors, weather extremes, and capacity service schedule slippages.

Capacity Margin — The difference between net capacity resources and net internal demand expressed as a percent of net capacity resources.

Marketer — An entity that has the authority to take title to electrical power generated by itself or another entity and remarket that power at market-based rates.

Metered Value — A measured electrical quantity that may be observed through telemetering, supervisory control and data acquisition (SCADA), or other means.

Metering — The methods of applying devices that measure and register the amount and direction of electrical quantities with respect to time.

Must-Run Generation — Generation designated to operate at a specific level and not available for dispatch. See Dispatchable Generation.

Net Capacity Resource — The total owned capacity, plus capacity available from independent power producers, plus the net of total capacity purchases and sales, less the sum of inoperable capacity, and less planned outages.

Net Dependable Capacity — The maximum capacity a unit can sustain over a specified period modified for seasonal limitations and reduced by the capacity required for station service or auxiliaries.

Net Energy for Load — The electrical energy requirements of an electric system, defined as system net generation, plus energy received from others, less energy delivered to others through interchange. It includes system losses but excludes energy required for storage at energy storage facilities.

Net Internal Demand — The metered net outputs of all generators within a system, plus the metered line flows into the system, less the metered line flows out of the system, less Direct Control Load Management and, less Interruptible Demand.

Net Schedule — The algebraic sum of all scheduled transactions across a given transmission path or between Control Areas for a given period or instant in time.

North American Electric Reliability Council (NERC) — A not-for-profit company formed by the electric utility industry in 1968 to promote the reliability of the electricity supply in North America. NERC consists of nine Regional Reliability Councils and one Affiliate whose members account for virtually all the electricity supplied in the United States, Canada, and a portion of Baja California Norte, Mexico. The members of these Councils are from all segments of the electricity supply industry — investor-owned, federal, rural electric cooperative, state/municipal, and provincial utilities, independent power producers, and power marketers. The NERC Regions are: East Central Area Reliability Coordination Agreement (ECAR); Electric Reliability Council of Texas (ERCOT); Mid-Atlantic Area Council (MAAC); Mid-America Interconnected Network (MAIN); Mid-Continent Area Power Pool (MAPP); Northeast Power Coordinating Council (NPCC); Southeastern Electric Reliability Council (SERC); Southwest Power Pool (SPP); Western Systems Coordinating Council (WSCC); and Alaskan Systems Coordination Council (ASCC, Affiliate).

OASIS (Open -Access Same-Time Information System) — An electronic posting system for transmission access data that allows all Transmission Customers to view the data simultaneously.

Off Peak — Those hours or other periods defined by contract or other agreements or guides as periods of lower electrical demand.

On Peak — Those hours or other periods defined by contract or other agreements or guides as periods of higher electrical demand.

Operating Criteria — The fundamental principles of reliable interconnected systems operation.

Operating Guides — Operating practices that a Control Area or systems functioning as part of a Control Area may wish to consider. The application of Guides is optional and may vary among Control Areas to accommodate local conditions and individual system requirements.

Operating Instructions — Training documents, appendices, and other documents that explain the Criteria, Requirements, Standards, and Guides.

Operating Policies — The doctrine developed for interconnected systems operation. This doctrine consists of Criteria, Standards, Requirements, Guides, and instructions and apply to all Control Areas.

Operating Procedures — A set of policies, practices, or system adjustments that may be automatically or manually implemented by the system operator within a specified time frame to maintain the operational integrity of the interconnected electric systems.

Automatic Operating Systems — Special protection systems, remedial action schemes, or other operating systems installed on the electric systems that require *no intervention* on the part of system operators.

Normal (Precontingency) Operating Procedures — Operating procedures that are normally invoked by the system operator to alleviate potential facility overloads or other potential system problems in anticipation of a contingency.

Postcontingency Operating Procedures — Operating procedures that may be invoked by the system operator to mitigate or alleviate system problems after a contingency has occurred.

Operating Requirements — Obligations of a Control Area and systems functioning as part of a Control Area.

Operating Reserve: Spinning Reserve Service — See Ancillary Services.

Operating Reserve: Supplemental Reserve Service — See Ancillary Services.

Operating Standards — The obligations of a Control Area and systems functioning as part of a Control Area that are measurable. A Standard may specify monitoring and surveys for compliance.

Operating Transmission Limit — The maximum value of the most critical system operating parameter(s) which meets: (a) precontingency criteria as determined by equipment loading capability and acceptable voltage conditions, (b) transient performance criteria or, (c) postcontingency loading and voltage criteria.

Outage

Forced Outage — The removal from service availability of a generating unit, transmission line, or other facility for emergency reasons or a condition in which the equipment is unavailable due to unanticipated failure.

Forced Outage Rate — The hours a generating unit, transmission line, or other facility is removed from service, divided by the sum of the hours it is removed from service, plus the total number of hours the facility was connected to the electricity system expressed as a percent.

Maintenance Outage — The removal of equipment from service availability to perform work on specific components that can be deferred beyond the end of the next weekend, but requires the equipment be removed from service before the next planned outage. Typically, a Maintenance Outage may occur anytime during the year, have a flexible start date, and may or may not have a predetermined duration.

Planned Outage — Removing the equipment from service availability for inspection and/or general overhaul of one or more major equipment groups. This outage usually is scheduled well in advance.

Overlap Regulation Service — A method of providing regulation service in which the Control Area providing the regulation service incorporates some or all of another Control Area's tie lines and schedules into its own Automatic Generation Control/Area Control Error equation.

Parallel Path Flows — The difference between the scheduled and actual power flow, assuming zero inadvertent interchange, on a given transmission path. Synonyms: Loop Flows, Unscheduled Power Flows, and Circulating Power Flows.

Planning (System) — The process by which the performance of the electric system is evaluated and future changes and additions to the bulk electric systems are determined.

Planning Guides — Good planning practices and considerations that Regions, subregions, power pools, or individual systems should follow. The application of Planning Guides may vary to match local conditions and individual system requirements.

Planning Policies — The framework for the reliability of interconnected bulk electric supply in terms of responsibilities for the development of and conformance to NERC Planning Principles and Guides and Regional planning criteria or guides, and NERC and Regional issue resolution processes. NERC Planning Procedures, Principles, and Guides emanate from the Planning Policies.

Planning Principles — The fundamental characteristics of reliable interconnected bulk electric systems and the tenets for planning them.

Planning Procedures — An explanation of how the Planning Policies are addressed and implemented by the NERC Engineering Committee, its subgroups, and the Regional Councils to achieve bulk electric system reliability.

Point of Delivery — A point on the electric system where a power supplier or wheeling entity delivers electricity to the receiver of that energy or to a wheeling entity. This point could include an interconnection with another system or a substation where the transmission provider's transmission and distribution systems are connected to another system.

Point of Receipt — A point on the electrical system where an entity receives electricity from a power supplier or wheeling entity. This point could include an interconnection with another system or generator bus bar.

Power

Apparent Power — The product of the volts and amperes. It comprises both *real* and *reactive* power, usually expressed in kilovoltamperes (kVA) or megavoltamperes (MVA).

Reactive Power — The portion of electricity that establishes and sustains the electric and magnetic fields of alternating-current equipment. Reactive power must be supplied to most types of magnetic equipment, such as motors and transformers. It also must supply

the reactive losses on transmission facilities. Reactive power is provided by generators, synchronous condensers, or electrostatic equipment such as capacitors and directly influences electric system voltage. It is usually expressed in kilovars (kvar) or megavars (Mvar).

Real Power — The rate of producing, transferring, or using electrical energy, usually expressed in kilowatts (kW) or megawatts (MW).

Power Flow Program — A computerized algorithm that simulates the behavior of the electric system under a given set of conditions.

Power Pool — Two or more interconnected electric systems planned and operated to supply power for their combined demand requirements.

Pseudo-Tie — A telemetered reading or value that is updated in real time and used as a tie line flow in the Automatic Generation Control/Area Control Error equation but for which no physical tie or energy metering actually exists. The integrated value is used as a metered megawatthour (MWh) value for interchange accounting purposes.

Ramp Period — The time between ramp start and end times usually expressed in minutes.

Ramp Rate (Schedule) — The rate, expressed in megawatts per minute, at which the interchange schedule is attained during the ramp period.

Rating — The operational limits of an electric system, facility, or element under a set of specified conditions.

Continuous Rating — The rating as defined by the equipment owner that specifies the level of electrical loading, usually expressed in megawatts (MW) or other appropriate units that a system, facility, or element can support or withstand indefinitely without loss of equipment life.

Normal Rating — The rating as defined by the equipment owner that specifies the level of electrical loading, usually expressed in megawatts (MW) or other appropriate units that a system, facility, or element can support or withstand through the daily demand cycles without loss of equipment life.

Emergency Rating — The rating as defined by the equipment owner that specifies the level of electrical loading, usually expressed in megawatts (MW) or other appropriate units, that a system, facility, or element can support or withstand for a finite period. The rating

assumes acceptable loss of equipment life or other physical or safety limitations for the equipment involved.

Reactive Supply and Voltage Control From Generating Sources Service — See Ancillary Services.

Real Power Loss Service — See Interconnected Operations Services.

Real-Time Operations — The instantaneous operations of a power system as opposed to those operations that are simulated.

Recallability — The right of a transmission provider to interrupt all or part of a transmission service for any reason, including economic, that is consistent with Federal Energy Regulatory Commission policy and the transmission provider's transmission service tariffs or contract provisions.

Region — One of the NERC Regional Reliability Councils or Affiliate.

Regional Reliability Council — One of nine Electric Reliability Councils that form the North American Electric Reliability Council (NERC).

Regional Transmission Group (RTG) — Voluntary organization of transmission owners, transmission users, and other entities interested in coordinating transmission planning and expansion and use on a regional and interregional basis.

Regulation and Frequency Response Service — See Ancillary Services.

Reliability — The degree of performance of the elements of the bulk electric system that results in electricity being delivered to customers within accepted standards and in the amount desired. Reliability may be measured by the frequency, duration, and magnitude of adverse effects on the electric supply. Electric system reliability can be addressed by considering two basic and functional aspects of the electric system — Adequacy and Security.

Adequacy — The ability of the electric system to supply the aggregate electrical demand and energy requirements of the customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.

Security — The ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.

Reliability Criteria — Principles used to design, plan, operate, and assess the actual or projected reliability of an electric system.

Remedial Action Scheme — See Operating Procedures

Rerating — A change in the capability of a generator due to a change in conditions such as age, upgrades, auxiliary equipment, cooling, etc.

Reserve

Operating Reserve — That capability above firm system demand required to provide for regulation, load forecasting error, equipment forced and scheduled outages, and local area protection.

Spinning Reserve — Unloaded generation, which is synchronized and ready to serve additional demand. It consists of Regulating Reserve and Contingency Reserve.

Regulating Reserve — An amount of spinning reserve responsive to Automatic Generation Control, which is sufficient to provide normal regulating margin.

Contingency Reserve — An additional amount of operating reserve sufficient to reduce Area Control Error to zero in ten minutes following loss of generating capacity, which would result from the most severe single contingency. At least 50% of this operating reserve shall be Spinning Reserve, which will automatically respond to frequency deviation.

Nonspinning Reserve — That operating reserve not connected to the system but capable of serving demand within a specific time, or Interruptible Demand that can be removed from the system in a specified time. Interruptible Demand may be included in the Nonspinning Reserve provided that it can be removed from service within ten minutes.

Planning Reserve — The difference between a Control Area's expected annual peak capability and its expected annual peak demand expressed as a percentage of the annual peak demand.

Response Rate

Emergency Response Rate — The rate of load change that a generating unit can achieve under emergency conditions, such as loss of a unit, expressed in megawatts per minute (MW/Min).

Normal Response Rate — The rate of load change that a generating unit can achieve for normal loading purposes expressed in megawatts per minute (MW/Min).

Restoration Service — See Interconnected Operations Services.

Schedule — An agreed-upon transaction size (megawatts), start and end time, beginning and ending ramp times and rate, and type required for delivery and receipt of power and energy between the contracting parties and the Control Area(s) involved in the transaction.

Schedule Confirmation — The process of verifying the accuracy of an interchange schedule(s) between all the entities to the transaction.

Scheduled Losses — The scheduled power transfer to a transmission provider for compensation of losses incurred on that provider's transmission system due to a transfer of power between purchasing and selling entities.

Schedule Implementation — The process of entering the details of a negotiated schedule into the control system(s) of a Control Area(s) involved in a transaction of power and energy.

Schedule Period — The length of time between the nominal starting and ending time of each schedule.

Scheduling, System Control, and Dispatch Service — See Ancillary Services.

Security — See Reliability.

Single Contingency — The sudden, unexpected failure or outage of a system facility(s) or element(s) (generating unit, transmission line, transformer, etc.). Elements removed from service as part of the operation of a remedial action scheme are considered part of a single contingency.

Special Protection System — See Operating Procedures.

Stability — The ability of an electric system to maintain a state of equilibrium during normal and abnormal system conditions or disturbances.

Small-Signal Stability — The ability of the electric system to withstand small changes or disturbances without the loss of synchronism among the synchronous machines in the system.

Transient Stability — The ability of an electric system to maintain synchronism between its parts when subjected to a disturbance of specified severity and to regain a state of equilibrium following that disturbance.

Stability Limit — The maximum power flow possible through some particular point in the system while maintaining stability in the entire system or the part of the system to which the stability limit refers.

Storage — Energy transferred from one entity to another entity that has the ability to conserve the energy (i.e., stored as water in a reservoir, coal in a pile, etc.) with the intent that the energy will be returned at a time when such energy is more usable to the original supplying entity. See also Banking and Energy Exchange. Synonym: Energy Banking.

Subregion — A portion of a Region. A subregion may consist of one or more Control Areas.

Substation — A facility for switching electrical elements, transforming voltage, regulating power, or metering.

Supervisory Control — A form of remote control comprising an arrangement for the selective control of remotely located facilities by an electrical means over one or more communications media.

Supervisory Control and Data Acquisition (SCADA) — A system of remote control and telemetry used to monitor and control the electric system.

Surge — A transient variation of current, voltage, or power flow in an electric circuit or across an electric system.

Synchronize — The process of connecting two previously separated alternating current apparatuses after matching frequency, voltage, phase angles, etc. (e.g., paralleling a generator to the electric system).

System — An interconnected combination of generation, transmission, and distribution components comprising an electric utility, an electric utility and independent power producer(s) (IPP), or group of utilities and IPP(s).

System Operator — An individual at an electric system control center whose responsibility it is to monitor and control that electric system in real time.

Telemetering — The process by which measurable electrical quantities from substations and generating stations are instantaneously transmitted using telecommunication techniques.

Thermal Rating — The maximum amount of electrical current that a transmission line or electrical facility can conduct over a specified time period before it sustains permanent damage by overheating or before it violates public safety requirements.

Tie Line — A circuit connecting two or more Control Areas or systems of an electric system.

Tie Line Bias — A mode of operation under automatic generation control in which the area control error is determined by the actual net interchange minus the biased scheduled net interchange.

Time Error — An accumulated time difference between Control Area system time and the time standard. Time error is caused by a deviation in Interconnection frequency from 60.0 Hertz.

Time Error Correction — An offset to the Interconnection's scheduled frequency to correct for the time error accumulated on electric clocks.

Total Transfer Capability (TTC) — The amount of electric power that can be transferred over the interconnected transmission network in a*reliable* manner based on *all* of the following conditions:

1. For the existing or planned system configuration, and with normal (precontingency) operating procedures in effect, all facility loadings are within normal ratings and all voltages are within normal limits.

2. The electric systems are capable of absorbing the dynamic power swings, and remaining stable, following a disturbance that results in the loss of any single electric system element, such as a transmission line, transformer, or generating unit.

3. After the dynamic power swings subside following a disturbance that results in the loss of any single electric system element as described in 2 above, and after the operation of any automatic operating systems, but before any postcontingency operator-initiated system adjustments are implemented, all transmission facility loadings are within emergency ratings and all voltages are within emergency limits.

4. With reference to condition 1 above, in the case where precontingency facility loadings reach normal thermal ratings at a transfer level below that at which any first contingency transfer limits are reached, the transfer capability is defined as that transfer level at which such normal ratings are reached.

5. In some cases, individual system, power pool, subregional, or Regional planning criteria or guides may require consideration of specified multiple contingencies, such as the outage of transmission circuits using common towers or rights-of-way, in the determination of transfer capability limits. If the resulting transfer limits for these multiple contingencies are more restrictive than the single contingency considerations described above, the more restrictive reliability criteria or guides must be observed. See Available Transfer Capability.

Transfer Capability — The measure of the ability of interconnected electric systems to move or transfer power *in a reliable manner* from one area to another over all transmission lines (or paths) between those areas under specified system conditions. The units of transfer capability are in terms of electric power, generally expressed in megawatts (MW). In this context, "area" may be an individual electric system, power pool, Control Area, subregion, or NERC Region, or a portion of any of these. Transfer capability is directional in nature. That is, the transfer capability from "Area A" to "Area B" is *not* generally equal to the transfer capability from "Area B" to "Area A."

Transmission — 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.

Bulk Transmission — A functional or voltage classification relating to the higher voltage portion of the transmission system.

Subtransmission — A functional or voltage classification relating to the lower voltage portion of the transmission system.

Transmission Constraints — Limitations on a transmission line or element that may be reached during normal or contingency system operations.

Transmission Customer — Any eligible customer (or its designated agent) that can or does execute a transmission service agreement or can or does receive transmission service.

Transmission Reliability Margin (TRM) — That amount of transmission transfer capability necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions. See Available Transfer Capability.

Transmission Provider — Any public utility that owns, operates, or controls facilities used for the transmission of electric energy in interstate commerce.

Unit Commitment — The process of determining which generators should be operated each day to meet the daily demand of the system.

Voltage Collapse — An event that occurs when an electric system does not have adequate reactive support to maintain voltage stability. Voltage Collapse may result in outage of system elements and may include interruption in service to customers.

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.

Voltage Limits

Normal Voltage Limits — The operating voltage range on the interconnected systems that is acceptable on a sustained basis.

Emergency Voltage Limits — The operating voltage range on the interconnected systems that is acceptable for the time sufficient for system adjustments to be made following a facility outage or system disturbance.

Voltage Reduction — A means to reduce the demand by lowering the customer's voltage.

Voltage Stability — The condition of an electric system in which the sustained voltage level is controllable and within predetermined limits.

Wheeling — The contracted use of electrical facilities of one or more entities to transmit electricity for another entity.

Joint EC/OC Task Force
on NERC Glossary of Terms

Sam L. Daniel (Chairman/SERC – EC)
Supervisor, Interconnections & Reliability
Southern Company Services, Inc.
Birmingham, Alabama 35202-2625

Charles V. Waits (ECAR – OC)
Director of Power Planning
Consumers Power Company
Jackson, Michigan 49201-8642

James A. Byrd (ERCOT – OC)
Vice President Transmission Grid Management
TU Electric
Dallas, Texas 75211-6716

Frank J. Koza, Jr. (MAAC – EC)
Director, System Operations Division
PECO Energy Company
Philadelphia, Pennsylvania 19101-8699

Scott B. Wallace (MAIN – OC)
Director of Transmission Operations & Services
Wisconsin Power & Light Company
Madison, Wisconsin 53701-0192

Sheldon L. Berg (MAPP – OC)
Senior Administrator, Technical Services
Mid-Continent Area Power Pool
Minneapolis, Minnesota 55404

Timothy R. Bush (NPCC – OC)
Manager, Pool Operations
New York Power Pool
Schenectady, New York 12303

Michael Apprill (SPP – EC)
Vice President-Engineering
UtiliCorp United, Inc.-MPS
Kansas City, Missouri 64138

Richard S. Bayless (WSCC – EC)
Manager, Resource & Transmission Planning
PacifiCorp
Portland, Oregon 97232

Eugene F. Gorzelnik (NERC)
Director-Communications
North American Electric Reliability Council
Princeton, New Jersey 08540-3751