

Glossary of Terms

Ammonia: A colorless, pungent, gaseous compound of nitrogen and hydrogen (NH₃), possessing strong alkaline properties when in solution. It is soluble in water to an unusual degree, one part of water absorbing 600 parts of the gas. It is used as a refrigeration gas because of the ease with which it is liquefied at moderately low temperatures by means of high pressure.

Anhydrous: Devoid of water.

Annual System Load Factor: The ratio of the average load over one year to the peak load occurring during that year. System load factor is calculated as follows:

$$ALF = \frac{KWH}{KW \times 8760 \text{ hrs.}}$$

where KWH equals the annual consumption, and KW is the annual peak.

Anthracite: The most highly carbonized and metamorphosed form of coal, containing 92 to 98 percent of fixed carbon. It is black, hard, and glassy.

Approximate Original Contour: That surface configuration achieved by backfilling and grading an area affected by surface mining so the reclaimed area closely resembles the general configuration of the land prior to mining.

Aquifer: A water bearing stratum of permeable rock, sand, gravel, or other geologic material.

Argon: A colorless, odorless gaseous element found in the air and in volcanic gases and used especially as a filler for electric bulbs and electron tubes.

Ash: Solid residue left where combustible material is thoroughly burned or is oxidized by chemical means.

Base Load - An electric utility's minimum power output over a given period of time. A base load generating plant is designed for continuous operation and generates electricity around the clock.

BATF (Bureau of Alcohol, Tobacco and Firearms): This federal agency, which is a division of the Department of Treasury, regulates and controls the storage and use of explosives.

Beneficiation: The processing of coal to remove unwanted constituents and to improve quality. Beneficiation may include ash and pyrite removal, coal drying and processing to improve stability and ease of handling.

Benzene: A colorless volatile flammable liquid aromatic hydrocarbon C₆H₆ used in organic synthesis, as a solvent and as a motor fuel.

Bituminous Coal: A soft coal formed by an intermediate degree of carbonization and containing 15 to 20 percent volatiles. The most common grade of coal.

Blasting Agent: A product used by the mining industry that contains no explosive ingredient, but can be made to detonate when initiated with a high-strength explosive primer.

British Thermal Unit (Btu): The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Busbar Cost: The total cost required to deliver electrical power to the generator bus, usually given in mills/kwh. This cost includes the fuel cost, fixed cost of the power plant, and operation and maintenance of the plant. Does not include the cost of the transmission system and general administrative costs.

Capacity: The electric load for which a generator, turbine, transformer, transmission circuit, apparatus, station or system is rated.

Carbon Dioxide (CO₂): Gas formed in animal respiration, decay or combustion of organic matter, and absorbed by plants in photosynthesis. A greenhouse gas.

Carbonaceous: Said of a rock or sediment that is rich in carbon; coaly.

Carbonization: The progressive changes undergone by preserved organic matter and biochemical decomposition products between the death of the plant and the stage of essentially complete reduction to residual carbon.

Catalyst: A material which increases the rate of a chemical reaction but does not react itself.

Chlorofluorocarbons (CFCs): Man-made gases used for insulation, refrigerants and foam packaging. A greenhouse gas.

Climate: The average course of the weather at a place over a period of years as exhibited by temperature, wind velocity and precipitation.

Coal: a dark brown to black combustible rock of organic origin formed over millions of years by the partial decomposition of plant material in an airless atmosphere, with increased pressures and temperatures over millions of years

Coal Gasification: The conversion of coal into methane, carbon oxides and other related compounds by the addition of steam and oxygen under high temperature and pressure.

Coalification: The alteration or metamorphism of plant material into coal.

Combustion: The chemical process by which hydrocarbons are oxidized to synthesize carbon dioxide and water. Energy is released during combustion of hydrocarbons.

Competition - The economic force which regulates price in the marketplace.

Continental Glaciation: The increase in the size of the world's ice fields which covered major parts of the continents, in thicknesses of up to 1,500 feet in the Williston Basin area.

Conversion: The degree of formation of products from feeds in a chemical reaction. For example, in a shift conversion, the products are hydrogen and carbon dioxide; the feeds are carbon monoxide and steam. Changes in the amount of a feed, the process conditions, or catalyst activity changes the amount of conversion from feed to products.

Core Sample: A columnar sample of rock obtained by drilling with a hollow bit and core barrel.

Cropland: Land used for the production of adapted crops for harvest, alone or in a rotation with grasses and legumes and includes row crops, small grain crops, hay crops, nursery crops, orchard crops and other similar specialty crops.

Cresols: Any of three colorless crystalline or liquid isomeric phenols C₇H₈O.

Demand: The rate at which electric power is consumed by a system, expressed in kilowatts or megawatts. Demand and capacity are normally considered synonymous.

Deregulation - Removal of barriers that limited competition for customers in the marketplace.

Direct Respread: A method of respraying soil in which the material is removed from an undisturbed area and immediately respread on a graded, approved site.

Distillation: A process that consists of driving gas or vapor from liquids or solids by heating and condensing to liquid products and that is used especially for purification, fractionation, or the formation of new substances.

Domestic Coal: A term used by the industry to designate coal that is to be used in homes and institutions in a mine's trade area.

Dozer: A highly versatile piece of earth excavating and moving equipment used in leveling spoil banks, building roads, benching pits and ripping coal. These machines can be of two types - track or rubber-tired.

Dragline: Large mobile excavator used to remove overburden, and sometimes interburden, from over the coal seams.

Economics - The study of the way we allocate resources among alternatives to satisfy human wants and needs.

Effluent Limit: The permitted limit on the amount of suspended solids, iron, or acidity/alkalinity that can be in water discharged from a permitted facility. Effluent limits may be placed for other chemical or physical parameters by regulation or permit.

Energy: Electrical power generated, measured in kilowatt hours.

Environmental Protection Agency: An agency of the federal government which establishes standards that coal mines meet prior to and during mining.

Externalities - The environmental and social costs of producing a product. They are not real costs, but perceived costs used to encourage use of one product over another.

Fixed Carbon: The solid residue, other than ash, obtained by destructive distillation determined by definite prescribed methods.

Fixed Cost: Those costs of a facility that are incurred on a continuing basis even though the facility may not be operating and would normally include depreciation, interest, taxes and insurance.

Fluidization: The process by which air or gases move through a bed of fine grained solids to cause the bed to flow like a liquid.

Fluvial: Of, or pertaining to, rivers; growing or living in streams or ponds; produced by river action, as a fluvial plain.

Fuel Cost: The sum of the cost of fuel delivered to the bunkers, including freight, and other transportation charges, the cost of unloading and reclaiming labor and maintenance.

Fuel Oil: Combustible matter, derived from crude oil, used as a source of heat energy.

Gas Liquor: Primarily water which has been used to scrub the gasifier raw gas stream and contains tars, oils, ammonia, phenol and dust.

Gasification: The conversion of coal to a gaseous fuel. The partial oxidation of coal to form a gaseous mixture containing carbon monoxide, hydrogen and methane.

Generating Capacity - The quantity of electric energy a power plant is capable of producing, usually measured in kilowatts or megawatts.

Geology: The science which studies the earth, the rocks of which it is composed, and the changes which it has undergone or is undergoing.

Geophysical Logging Rig: A vehicle setup for the logging of drilling holes using a probe which measures the geophysical properties of the subsurface strata (e.g., natural gamma radiation, density, electrical resistance, hole diameter).

Global Climate Models (GCM): Computer models used to predict changes in climate based on a variety of factors, including greenhouse gas concentrations.

GPS: Geographic Positioning System, used to replace traditional land survey techniques, locating spatial orientation and elevation with satellite transmissions and receivers mounted in vehicles, heavy equipment or hand carried.

Grass Drill: A specially designed machine that will seed various grass species. It is equipped with special seed boxes, agitators, depth bands and feed and calibration mechanisms.

Greenhouse Effect: Process by which most short-wave radiation from the sun passes through the earth's atmosphere while most of the reradiated long wave radiation is captured by the atmosphere. Responsible for warming average earth's temperature from about 0° to about 60° C.

Greenhouse Gases: Gases which capture long-wave radiation and warm the earth's atmosphere (carbon dioxide, CFCs, methane, water vapor, nitrous oxide).

Gross Generation: The total amount of electric energy produced by a generating station or stations, measured at the generator terminals. This includes net generation and station service.

Ground Cover: The area of ground covered by vegetation and the mulch that is produced naturally onsite, expressed as a percentage of the total area of measurement.

Groundwater: Water which is contained in the voids and cracks of the subsurface strata.

Heat Rate: The amount of BTUs (British Thermal Units) required to produce 1 KWH of energy, normally given as BTU per KWH.

Heterogeneous: A mixture of diverse or dissimilar ingredients or constituents.

Highwall: The steep overburden slope of the pit.

Hydrocarbon: A compound containing only hydrogen and carbon. They form the principal constituents of petroleum. The simplest hydrocarbons are gases at ordinary temperatures; but, with increasing molecular weight, they change to the liquid form and finally the solid state. Their boiling and melting points are, in general, proportional to their molecular weight.

Hydrogen: A gaseous element, colorless, odorless, tasteless, flammable, and lighter than any other isolated element. Its symbol is H, and in conjunction with carbon it forms many long series of compounds which are the most important constituents of petroleum.

Hydrogenating: To combine or treat with or expose to hydrogen; to add hydrogen to the molecule of an unsaturated organic compound.

Installed Cost: The capital investment or equivalent annual cost of a facility. The installed cost is the total investment cost of a facility including labor, materials, right-of-way, engineering, and overhead. Does not include variable costs such as operations, maintenance, and taxes.

Interburden: Material between coal seams.

Introduced Species: Plants which have been introduced into North America from other continents.

Kilowatt: Kilowatt (KW) is the instantaneous capacity or demand. KW is also the real power generated and/or sold to a consumer. KW is a thousand watts of electric power.

Kilowatt-Hour (KWH) - The basic unit of electric energy equal to one kilowatt of power supplied to or taken from an electric circuit steadily for one hour. This is the unit used to measure electric consumption on consumer bills.

Krypton: A colorless, odorless gaseous element found in air and used as a filler for electric light bulbs and in electronics manufacturing.

KVA, MVA: Kilovoltamperes, megavoltamperes is the total rated capacity of generation or transmission equipment. If the KVAR or MVAR is excessive, the KW or MW must be reduced to avoid exceeding the KVA or MVAR capacity.

Lacustine: Produced by or belonging to lakes, of, or pertaining to or formed or growing in, or inhabiting lakes.

Land Use: Specific uses or management-related activities, rather than the vegetation or cover of the land.

Lignite: Brownish-black coal in which the alteration of vegetal material has proceeded further than in peat but not so far as subbituminous coal. Heat content is less than 7,000 Btu (moist, mineral-matter-free).

Liquefaction: The process by which coal is chemically and physically altered to become liquid.

Liquor Stream: A process stream having a high concentration of organic and inorganic soluble compounds.

Load Management - The process of shifting customer demand to better meet a utility's generating capabilities.

Load Shaping - The process of changing customer demand for electricity from one time of day to another.

Loading Shovel, Front-End Loader: Equipment used to load coal into haulage trucks.

MAPP - Mid-Continent Area Power Pool - A group of power generation and transmission utilities who coordinate an electric power network in the Upper Midwest and Two Canadian provinces.

Lurgi Process: A coal gasification process which produces gas in a reactor through the controlled reaction of coal and oxygen in the presence of excess steam at elevated temperatures and pressures.

Megawatt: Megawatt (MW) is the instantaneous capacity or demand. A thousand kilowatts of electric power.

Megawatt Hour: Megawatt Hour (MWH) is the amount of electric energy provided by 1 megawatt in 1 hour.

Marine Rocks: Sedimentary deposits deposited under sea (marine) conditions.

Mercaptans: Sulfur compounds, analogous to alcohols, in which sulfur has replaced oxygen. They are colorless, flammable liquids with a strong, repulsive odor. There is a long series of organic mercaptans, many of which occur naturally in crude oil. Some types of mercaptans are added to natural gas to indicate gas leaks by odor detection.

Metabolism: The chemical change by which carbohydrates are oxidized and energy is provided for biological processes.

Metamorphism: The changes of mineralogy and texture imposed on a rock by pressure and temperature in the earth's interior, as well as the introduction of new chemical substances. Metamorphism does not include changes resulting from simple burial and the weight of subsequently accumulated overburden.

Methanation: A process of converting carbon monoxide and carbon dioxide present in synthetic gas to methane, using hydrogen, steam, heat and appropriate catalysts. This process increases the Btu content of SNG.

Methane (CH₄): Gaseous hydrocarbon that is a product of the decomposition of organic matter and the burning of fossil fuels. A greenhouse gas.

Methanol: A flammable colorless liquid infinitely soluble in water. The simplest possible alcohol.

MSHA (Mine Safety and Health

Administration): This federal agency oversees the health and safety of miners on the job.

Mulch: Vegetation residues or other suitable materials that aid in soil stabilization and moisture conservation.

Nameplate Capacity: The maximum design of the electric capability as shown by the nameplates of generating units, turbines, synchronous condensers, transformers, or other equipment in a station or system.

Naphtha: The lightest liquid constituents of oil separated by distillation processes. The word was derived from the Persian word “nafata,” meaning to “exude,” and was originally applied to petroleum oils and shale oils indiscriminately. The term is now used in a very general sense, and has no specific scientific application to any particular liquid.

Native Grassland: Land on which the natural potential plant cover is principally composed of native grasses, grasslike plants, forbs and shrubs valuable for forage and is used for grazing.

Native Species: Plants which have evolved in North America.

Natural Gas: A mixture of gaseous hydrocarbons found in many places connected with deposits of petroleum, to which the gaseous compounds are closely related.

Net Generation: Gross generation less the station service energy used to operate the generating plant.

Net Generation Available at Load: Net generation, less reserves and transmission losses, which can be considered available at the delivery points to serve member loads.

Nitrogen: A colorless tasteless odorless gaseous element that constitutes 78 percent of the atmosphere by volume and occurs as a constituent of all living tissues in combined form.

Nitrous Oxide (N₂O): A gas produced from fertilizers, fossil fuels and many natural processes. A greenhouse gas.

Office of Surface Mining (OSM): An agency of the federal government which insures all mines meet federal standards.

Outcrop: A segment of bedrock exposed by erosion to the atmosphere, visible to the eye.

Overburden: All of the earth and other materials, except SPGM, which lie above the lignite. After overburden is moved it is called spoil.

Oxides of Nitrogen (NO_x): Gases produced by the burning of fossil fuels. With volatile organic compounds, thought to be responsible for ozone formation. With SO₂ thought to be responsible for acid rain.

Ozone (O₃): Triatomic form of oxygen formed naturally in the upper atmosphere and also generated commercially. Desired in the upper atmosphere as a shield from harmful rays from the sun. Undesirable in lower atmosphere as a major agent in the formation of smog.

Peak Demand - The maximum customer use of electricity during a specific period of time.

Peak Load - The maximum electricity load consumed or produced during a specific period of time.

Peaking Capacity: Generating equipment normally operated only during the hours of highest daily, weekly or seasonal loads. Some generating equipment may be operated at certain times as peaking capacity, and at other times to serve loads on a round-the-clock basis.

Peat: A dark-brown or black structureless groundmass produced by the partial decomposition and disintegration of plant material in a marsh or swamp.

Performance Bond: A surety bond, collateral bond, self bond, deposit or alternative form of security approved by the Public Service Commission by which a mining company assures faithful performance of all requirements of the reclamation laws and regulations.

Permit: A document which allows a company to conduct surface mining and reclamation in North Dakota. It is prepared by the company and submitted to the ND Public Service Commission for its review. Following approval, it is valid for a five-year period.

Phenols: Any of various organic compounds which are hydroxyl derivatives of aromatic hydrocarbons.

Photosynthesis: The chemical process by which carbohydrates (hydrocarbons) are synthesized from carbon dioxide and water in the presence of light. Photosynthesis is a chemical process called reduction during which energy is stored.

Pit: The excavated hole dug by a dragline or auxiliary equipment.

Plant Availability: The time generating equipment is available for service, divided by the total time in a month or year.

Plant Capacity Factor: The total generating output of a plant for a known period of time divided by the capacity of the plant, times the hours on-line. This number is normally in percent and indicates the percent a plant is operated at rated capability while on-line.

Plant Load Factor: The total generating output of a plant for a known period of time, divided by the capacity of the plant, times the total time in a month or year. This is similar to Load Factor only in that it refers to the output of a power plant.

Power: The electrical energy sold or generated by a utility. Power normally means both capacity and energy.

Pozzolan: Finely divided silica and alumina materials that react with slaked lime in the presence of moisture to form a strong slow-hardening cement.

Precipitation Event: A rain or snowfall usually expressed in terms of magnitude compared to time; e.g., 10-year/24-hour event = 3.25 inches which means a 3.25 inch rainfall over a 24-hour period usually can be expected to fall sometime within a 10-year period.

Probable Hydrologic Consequences: An analysis of the probable effects of mining on the surface and groundwater hydrology in terms of water flows, availability, and quality. Required as part of a mining permit application. May be prepared by the mining company or regulatory agency.

Productivity: A measurement of vegetation production on a reclaimed area for specified time, usually expressed in pounds per acre or bushels per acre per year.

PSIG: Pounds per square inch gauge.

Public Service Commission (PSC): The State of North Dakota agency that promulgates and enforces reclamation and mining laws.

Push-Pull Mode: An industry term that describes the method used by tractor-scraper to increase their production efficiency by hooking the two machines together when in the loading phase of the cycle.

Rank: Those differences in the pure coal material due to geological processes whereby the coal material changes from peat through lignite and bituminous coal to anthracite or even to graphite.

Reactor: A vessel in which hydrocarbons are reacted with chemicals or other hydrocarbons to obtain the desired end products.

Reclamation Plan: Submitted by a company as part of a permit which sets forth a plan to reclaim a surface mine.

Reserves: Unloaded generating capacity available for service.

Rectisol: Processing section which removes carbon dioxide, naphtha, sulfur compounds and HCN from the mixed gas by contact with cold methanol.

Scoria: Informal name for porcelanite, which is a rock formed by the baking of clay materials by underlying, burning coal seams.

Sedimentary Deposits: Rocks formed by the accumulation of rock or mineral grains transported by wind, water, or ice to be deposited or chemically deposited.

Side Stream: A liquid product stream taken from one of the plates of a bubble tower.

SNG: Synthetic Natural Gas. Methane is the primary constituent of SNG.

Soil Horizons: Contrasting layers of soil lying one below the other, parallel or nearly parallel to the land surface. Soil horizons are differentiated on the basis of field characteristics and laboratory data. The three major horizons are:

“A” horizon - the uppermost layer of the soil profile, often called topsoil. It is the part of the soil in which organic matter is most abundant and where leaching of soluble or unsuspended particles is the greatest.

“B” horizon - the layer immediately beneath the A horizon. This middle layer commonly contains more clay, iron or aluminum than the A or C horizons.

“C” horizon - the deepest layer of the soil profile. It consists of loose material or weathered bedrock that is relatively unaffected by biologic activity.

Soil Survey: The identification and location of all SPGM within a permit area and an accompanying report that describes, classifies and interprets the nature and use of the material.

SPGM: Suitable Plant Growth Material is a collective term for topsoil and subsoil inventoried by a Professional Soil Classifier to a depth of several feet, that meets certain chemical and physical parameters.

Specialty Products: Products and markets for lignite other than fuel for large-scale coal-burning power plants and for the production of syngas.

Spinning Reserves: The amount of unloaded generation held in generating units capable of immediately picking up load following the loss of another generating unit. Spinning reserves of any generator shall not exceed the amount of generation increases that can be realized in 10 minutes.

Spoil or Spoil Pile: Overburden or interburden which has been removed from over the coal seam by the dragline.

State Health Department: North Dakota's lead agency for enforcing EPA regulations.

Strip Mining: The mining of coal by surface methods; the name comes from the shape of the pit containing coal.

Stripping Ratio: The ratio of earth moved per unit of coal uncovered, often yards of earth to move per ton of coal uncovered, sometimes vertical depth in feet to move per ton of coal uncovered.

Sulfur Dioxide (SO₂): Gas produced by the burning of fossil fuels which contain sulfur. Thought to be responsible for acid rain.

Synthesis Gas: The materials from which product compounds are made synthetically. The primary components of synthesis gas are carbon monoxide and hydrogen.

Tame Pastureland: Land used for the long-term production of predominantly adapted, introduced species of forage plants to be grazed by livestock.

Tipple: Coal preparation facility that crushes the coal according to the customer specification.

Tractor-Scrapers (Scrapers): Two-axle earth moving units which load by lowering a cutting edge into the earth and moving forward producing an action similar to a cheese slicer. The resultant loose dirt is pushed into the scraper bowl until filled.

Transmission Capacity Losses: The power lost in transmission between one point and another.

Variable Costs - Those costs which vary with the level of output.

Volatile Matter: Gaseous materials that are readily lost from a system if not confined; also, substances such as water and carbon dioxide, which are loosely bound into a mineral structure and can escape from a rock if the minerals break down during metamorphism.

Wholesale Rate: The rate at which a utility must sell power to another utility in order to recover all investments and operating costs.

Williston Basin: The tectonic synclinal depression of strata with its center in North Dakota and extending over parts of three other states and part of Canada.

Woodland: Land where the primary vegetation is trees or shrubs, including natural wooded areas and shelterbelts and other man-made woody plantings.