

GLOSSARY

Alternating current (AC): Electric current that reverses its direction of flow at regular intervals.

Ancillary services: Ancillary services include spinning, supplemental and regulation-reserve services which are required by the system operator for the secure stable operation of the electrical system.

Average energy: is the average of energy produced across the range of historic water flow conditions.

Bilateral contract: A contractual agreement between two market participants for the purchase or sale of capacity and/or energy.

Bottled Capacity: Capacity of generating equipment that is available for export but, due to limited transmission capability, not able to reach the market.

Bulk power market: The market in which large amounts of electricity at high voltages is exchanged usually from one utility to another for the purpose of resale.

Carbon offsets: An offset represents the reduction, removal, or avoidance of GHG emissions from a specific project that is used to compensate for GHG emissions occurring elsewhere.

Capability: The energy output of a generating station or the integrated system under specified conditions for a given time interval (usually one year).

Capacity: The rated power output of a machine or power plant, or a transmission line's ability to transmit electricity at any instant, normally measured in kilowatts (kW) or megawatts (MW).

Several terms are commonly used:

- Maximum capacity: the maximum output that can be achieved.
- Nameplate capacity: the maximum output specified by the manufacturer.
- Dependable capacity: the maximum output that can be reliably supplied coincident with the system peak load; and
- Firm capacity: based on the dependable capacity, unit availability and system characteristics.

Capacity factor: The ratio of the average power output over a given period of time to the maximum capacity.

Capital cost: The total investment needed to complete a project and bring it to a commercially operable status. The costs associated with construction of a new facility, improvement of an existing facility or the purchase an existing facility.

Cashflow: Annual payments comprising in the total investment needed to complete a project and bring it to a commercially operable status.

Coffer Dam: A cofferdam is a temporary enclosure built within or across a body of water and constructed to allow the enclosed area to be pumped out, creating a dry work environment for major work to proceed.

Cogeneration: The sequential production of mechanical or electrical energy and useful thermal energy (steam or hot water) from a single fuel source.

Combined cycle combustion turbine: The combination of a gas turbine and a steam turbine in an electric generation plant. The waste heat from the gas turbine provides the heat energy for the steam turbine (CCCT).

Combustion turbine: See Gas turbine.

Congestion: When there is insufficient transmission to deliver all of the lowest-cost power to the load, the 20 transmission line is said to be congested.

Contingency or operating reserves: To allow for such sudden generation or transmission outages, power system operators must have available spare generation that is ready to operate units.

Current dollars: The actual dollars spent in any year (historic or future) and would include the effect of inflation (see Nominal Dollars).

Curtailed load: A DSM load reduction program in which customers agree to a partial or complete power shut off during peak or capacity short load periods in exchange for lower electricity rates. The program is suitable for customers whose operations are flexible or who have a back-up energy source.

Debt/equity ratio: A measure of the relative size of a company's debt to the value of its total worth. A 75:25 debt/equity ratio signifies that 75% of the assets of the company have been financed through debt and that 25% has been contributed by the owners. In the case of Manitoba Hydro, the sole source of the equity capital has been the retention of net earnings. Higher percentage levels of debt reduce the amount of investment required by the owners but result in higher interest costs and increase the likelihood that earnings will not be adequate to cover interest expense.

Demand: The average value of power, over a specified interval of time that is required and used by the customers' equipment. The demand is usually expressed in kilowatts or megawatts.

Demand Side Management (DSM): Actions planned or undertaken to influence the energy consumption or demand. The demand side management programs adopted by utilities attempt to alter the amount and/or timing of customers' use of electrical energy to reduce demand and overall consumption. (Also known as POWER SMART – Manitoba Hydro is a licensee of the Official Mark.)

Dependable energy: the maximum energy that the Manitoba Hydro system can produce (Manitoba generation plus imports) during the lowest (critical) flow period. The dependable energy available to Manitoba Hydro is the sum of dependable energy from hydro generation (within Manitoba), imports, thermal generation (within Manitoba), and wind generation (within Manitoba).

Disaggregation: The functional separation of the vertically integrated utility into smaller individually owned business units (i.e. generation, transmission, distribution, etc.).

Discount rate: The discount rate is the rate by which the future value must be "discounted" in order to recognize the true time value of money.

Dispatchability: the ability to start, operate, and stop generating units as necessary to meet system requirements at the discretion of the system operator.

Direct current (DC): Electric current that flows in one direction only.

Distribution generation: Electricity generation, usually on a small scale, which is located throughout the electrical distribution system, usually closer to load centres, to optimize the transmission and distribution system, or distributed because of the site specific availability of the generation.

Distributed system: Electrical conductors or lines, transformers and switches used to distribute electricity over short distances from the substations to the customer. The distribution system voltage is generally less than 69 kV.

Diversity Agreements: Agreements that provide for the seasonal exchange of power between utilities during their respective peak load conditions when the utilities have opposite peak load seasons.

Efficiency: The effective rate of conversion of a natural resource to useable energy and capacity.

Electric current: The flow of charged particles (electrons) through a conductor such as a cable.

Energy: The ability to do work. Electrical utilities sell electrical energy to their customers who, in turn, convert this energy into a desirable form – such as work, heat, light or sound. Electrical energy is measured in KWh, MWh, and GWh.

Energy capability: The assured amount of energy that a generating plant can produce in a given time period (usually one year).

Engineering economics: Process of identifying alternative ways of using monetary resources to achieve an objective (such as producing energy) by applying mathematical concepts and models which fairly compare those alternatives, even though they may exhibit significant differences in magnitude and timing of capital, operating and other costs and benefits.

Escalation Reserve: is intended to cover the anticipated additional costs to the project associated with cost escalation greater than Canadian CPI. The reserve is based on the additional costs associated with a standard year-over-year escalation rate of 2.5%, compared to escalation following Canadian CPI. This standard rate was obtained by taking the approximate average escalation rate between the Canadian CPI and a composite escalation rate (or “basket” rate) of commodities typical of a hydroelectric generating station (e.g. steel, cement, construction labour, etc.). The composite escalation rate is developed by combining a number of individual market escalation indices (items such as construction labour, steel, cement, etc.), based on their estimated use in the construction of a generating station, to form a single composite rate

Equity: The owner’s investment in an enterprise, represented in the financial statement of utility as the value of outstanding and preferred stock, retained earnings (reserves), and any additional paid-in-capital.

Externalities: The impacts of electric power generation on other activities or resources that are not priced in the marketplace (such as the environment, human health or recreation).

Export load: Any electricity that is generated in excess of provincial needs and is sold to out-of-province energy markets.

The U.S. Federal Energy Regulatory Commission (FERC): FERC currently regulates price, terms, and conditions of power sold and transmission used for interstate commerce in the United States.

Firm export: The assured sale of a contracted amount of energy and /or capacity to utilities or customers located outside the boundaries of Manitoba.

Firm power: Capacity and energy that must be supplied to the Manitoba load or as agreed under export contract, and is intended to be available at all times specified. Firm power cannot be interrupted for economic purposes or during adverse conditions, such as periods of high demand. Firm power can only be interrupted in extreme conditions such as system emergencies and when system reliability is threatened.

Firm Transmission Service: Full path transmission service of the highest priority that may not be interrupted unless all lower priority levels of service have already been interrupted.

Fixed costs: Costs incurred regardless of the variability of the output of the energy resource.

Frequency: The number of completed cycles that an electric current or voltage goes through in one second. In Manitoba the electric current completed 60 cycles in one second (60 hertz).

Gas turbine: (combustion turbine) A turbine that converts the energy of hot compressed gases (produced by burning fuel in compressed air) into mechanical power; often fired by natural gas or fuel oil.

Generator: A machine that converts mechanical energy – such as a rotating turbine driven by water or steam or wind – into electrical energy.

Gigawatt (GW): The unit of electrical power equivalent to one billion watts or one million kilowatts.

Gigawatt hour (GWh): The amount of electrical energy produced by one gigawatt of power over the period of one hour.

Greenhouse gases (GHG): Gases which contribute to global warming, or the so-called “Greenhouse Effect”. There are several such gases including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The effects of these gases are often cited in terms of their equivalence to CO₂ (CO_{2e}).

Grid: A system of interconnected power lines and generators that is managed so that the generators are dispatched as needed to meet the requirements of the customers connected to the grid at various points.

Gross Domestic Product (GDP): A measure of total domestic economic activity (i.e. the sum of all goods and services produced in a given period of time).

Hurdle rate: In capital budgeting, the minimum acceptable rate of return on a project. The hurdle rate is equal to marginal cost of capital, adjusted for the project's risk.

In-service cost: The total cost to build a project including the capital cost in constant dollars, plus price escalation between the date of the estimate and the date of actual expenditures, plus capitalized interest to reflect the opportunity cost of funds utilized or the cost of actual borrowings for the project, plus the transfer-in of pre-project design and study costs that have not otherwise been recovered through amortization.

Independent Power Producer (IPP): A privately owned electricity generating facility which may be connected to a utility's system to sell electricity.

Independent System Operator (ISO): An entity which has no ownership interest in facilities but operates and administers the power system for the owners under a contractual agreement.

Intactness: The degree to which an ecosystem remains unaltered by human features that remove habitat and increase fragmentation. Fragmentation is a landscape-level process in which human features progressively subdivide habitat blocks into smaller and more isolated fragments.

Integrated System: Integrated system is the interconnected network of transmission lines, distribution lines and substations linking generating stations to one another and to customers throughout the electric system.

Interconnections: Power lines that interconnect one electrical utility's power system with another. Interconnections facilitate the export and import of power.

Interest: The charge or cost of using money expressed as an annual percentage rate.

Interest coverage: A measure of the safety margin by which earnings before interest expense exceed period interest costs. When expressed as a ratio, a value of 1.15 indicates that net revenue could decline by no more than 15% due to revenue decreases and/or cost increases before there would be insufficient earnings to pay interest costs. A ratio of less than 1 indicates that the company will have to borrow more money to pay its interest expense.

Internal rate of return: The rate of return on an asset investment, calculated by finding the discount rate at which the present value of revenue cashflows equals the present value of cost cashflows.

Interruptible Energy: A supply of energy which is subject to short or long-term interruption with or without notice.

Investor Owned Utility (IOU): An electric or gas utility which raises money for construction from willing investors by selling common shares of stock. The investors in turn may receive periodic return on their investment in the form of cash dividends, the payment of which is at the discretion of the utility.

Kilovolt (kV): The unit of electrical pressure, or force, equivalent to 1000 volts (V).

Kilowatt (kW): The unit of electrical power equivalent to 1000 watts (W).

Kilowatt-hour (kWh): The unit by which electrical energy is measured. For example, 10, 100-W light bulbs switched on for one hour would use one kilowatt-hour (1000 W one hour).

Levelized energy costs: The present value of the net cost (including capital, operating costs and any other fixed and variable costs) of a particular generation alternative divided by the present value of the average energy produced by that generation alternative over its economic life, expressed in cents per kilowatt hour or dollars per megawatt hour.

Load: The amount of power that needs to be generated to supply demand.

Load displacement: The freeing of electricity from an existing customer's load (future or present) by using electricity more efficiently to perform the same amount of work (i.e. lighting, torque, etc.), or by the addition of customer self-generation.

Load factor: The ratio of the average load supplied during a given period to the maximum load occurring during the same period.

Load forecast: The expected customer electricity requirements that will have to be met by the electrical system in future years.

Locational marginal price: the market clearing price for energy which includes separate components for the marginal costs of energy, congestion, and losses at different nodes or locations within the MISO footprint

Long-term firm exports: The assured sale of electricity to parties outside Manitoba where the quantity and price of the electricity are fixed over the long-term period.

Losses (transmission line): Energy lost as heat in electrical equipment and along transmission lines as electricity is transferred from one location to another.

Marginal cost: The incremental cost saving associated with an incremental decrease in load or an incremental increase in supply which would result in a changed future utility system expansion and operation. This is used as a measure for evaluating individual DSM and supply options.

Market-based rates: Rates set by mutual decisions of many buyers and sellers in a competitive market.

Manitoba Public Utilities Board (MPUB): A regulatory body appointed by the Government of Manitoba that has regulatory authority over Manitoba Hydro's rates charged to Manitoba consumers.

Megawatt: The unit of electrical power equivalent to 1,000,000 watts (W).

Mid-Continent Area Power Pool (MAPP): One of ten regional reliability councils operating under NERC guidelines.

Midcontinent Independent System Operator, Inc. (MISO): MISO is an independent, not-for-profit regional transmission organization responsible for maintaining reliable transmission of power in 15 U.S. states and the Canadian province of Manitoba.

MISO Transmission Expansion Plan (MTEP): A report prepared annually by MISO to develop a comprehensive transmission expansion plan that meets the reliability, policy and economic needs of the region.

Multi Value Project (MVP): transmission projects that have been identified as qualifying in several categories including public policy needs, congestion relief and fuel savings, operating reserve margin and system planning reserve margin reductions, and transmission line loss reductions.

Net Load: The forecast Manitoba load minus expected load reductions from planned DSM programs.

Net Present Value (NPV): Net present value is the difference between the present value of expected cash inflows and the present value of expected cash outflows of a project under consideration.

Non Utility Generation (NUG): Electrical power produced by an enterprise which is not an electrical utility. The energy may be used to supply the producers' own needs or sold to a utility.

North American Electric Reliability Council (NERC): A voluntary organization covering North America to coordinate reliability of electric supply.

Off Peak Period: The following hours in a week during which the market load is typically lower than the weekly average load: Overnight- 7 days x 8 hours / day; Weekends- 2 days x 12 hours per day; Total = 80 hours per 168 hour week.

Operating or contingency reserves: To allow for such sudden generation or transmission outages, power system operators must have available spare generation that is ready to operate—units

Organized Power Market: A centrally operated market which collects generation offers and dispatches generation to meet forecast loads, including exports from the market region, and which will provide physical energy to external market participants such as Manitoba Hydro on a non-discriminatory basis.

Peak demand: The maximum instantaneous demand experienced by a power system averaged over a given period of time, usually one hour.

Peak load: Record of maximum amount of electricity used in a given time period.

Peaking resources: A resource is specifically designated as being dispatchable and available to operate at any time, but generally only is utilized to meet peak demands on the highest load days of the year.

Power: The rate of using electrical energy, usually measured in watts, kilowatts, megawatts, or gigawatts.

Power grid: A number of interconnecting electrical power systems which link together electrical utilities covering a large geographical area.

Present value: the costs represent the cash outflows, or costs of the project over its life.

Ramp Rates (Ramp-up and Ramp-down): Most power plants cannot change their generation level instantaneously. Ramp Rate, including either ramp-up or ramp-down, is the maximum recommended rate of change in output from a power plant. It is typically expressed in units of megawatts per minute that a generator can change its output. For all thermal power plants a maximum ramp rate is established to prevent undesirable effects such as creep or fatigue failure due to rapid changes in temperature, unit loading or discharge. By operating a thermal unit within its recommended ramp rates unit operators are able to minimize damage, maximize the asset's life and reliability while reducing maintenance costs. Ramp rates are important when meeting rapidly changing loads, or supporting generation that may change suddenly (e.g. wind or solar power).

Real discount rate: The discount rate with the effects of inflation (general price escalation) removed when discounting future costs or benefits.

Real dollars: Dollar values from which the effect of inflation has been removed, such that the dollars are constant with respect to a given year (or base year). Also known as base or constant dollars.

Real escalation: Manitoba Hydro escalates costs in the price of specific goods or services associated with hydro-electric generation projects and natural gas-fired generation projects through a process called 'real escalation'. Manitoba Hydro escalates costs of more specific items or classes of items, as it has been determined that they change in price differently than more general cost escalators like the Consumer Price Index (CPI).

Reference Scenario: represents the "most likely" outcomes for the factors affecting Manitoba Hydro's future.

Renewable power: Wind, solar (photovoltaic) biomass geothermal and hydro-generated electricity. Resources that are naturally replenishable, but typically energy limited.

Residual value: The economic value of an asset at the end of the study period based on the original capital expenditures, service life, and in-service years (the period between the in-service date and the end of the study period). Also known as salvage value.

Renewal Portfolio Standard: A regulation that requires set levels of production of electricity from renewable energy sources.

Salvage value: See "Residual Value".

Sensitivity analysis: Simulation analysis in which key variables are changed one at a time and the resulting change in the rate of return is observed.

Service life: Estimation of the expected useful life of major system components.

Simple cycle combustion turbine (SCCT): A turbine powered by natural gas or fuel oil in an electric generation plant. The waste heat from the gas turbine is exhausted and not utilized (see gas turbine).

Stress Test: A simulation technique used on asset and liability portfolios to determine their reactions to different financial situations. Stress tests are also used to gauge how certain stressors will affect a company or industry. They are usually computer-generated simulation models that test hypothetical scenarios. This is also known as a "stress test".

Sunk costs: Expenditures that have already been committed or incurred, and therefore are excluded from the economic evaluation as they have no impact on the decision under consideration.

Supply Side Enhancements: Opportunities to upgrade infrastructure that will result in increased output from existing facilities. These enhancements are more than routine maintenance.

Transmission access: The obligation of transmission owners to offer to transmit, at predetermined rates, under standard terms and conditions, as created by FERC order #888 in the U.S.

Transmission system: The towers and conductors that transport electricity in bulk form from a source of supply to either local areas for distribution, or to power systems of out-of-province electrical utilities. Electricity is usually transported via transmission lines at voltages ranging from 66 kV to 500 kV.

Valued Environmental Component (VEC): Is an element of the environment identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance. The value may be determined on the basis of cultural ideals or scientific concern (adapted from CEAA).

Volt (V): The unit of measurement of electrical pressure, or force which causes electric current to flow.

Watt (W): The unit of measurement of electrical power.

Weighted Average Cost of Capital (WACC): The marginal costs of debt and equity weighted by the target proportions of debt and equity in the total capital structure.

Winter peak capacity: is the maximum rate of power output, measured in megawatts (MW) that the generator can be relied upon to produce at the time Manitoba load is at its winter maximum