

Hydropower Terminology Defined

For Hydropower Projects in Lao PDR
by Hobo Maps – Last Update June 2024

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Lao language terms below:

Ban = village or town
Buak (Buek) = man-made pond
Don = island or sandbar in a river such as Mekong
Houay (Huay) = small river or stream that may be dry part of the year
kip = monetary currency of Laos
Lao Loum = lowlands Lao people
Lao Souang = highlands Lao people
Lao Theung = midlands Lao people
Luang = may refer to a populated flat area in mountainous terrain
Muang (Meuang) = district
Nai Ban = village chief or head man
Nam = river or lake
Nong = natural low-area pond
Pak = town located where a river or stream joins a larger river
Phou or Pha = mountain or hill
Sathani rot fai = railway station
Tad = waterfall or cascade
Talad = traditional market
Xe = river (in southern Laos - pronounced as "say")

Terminology below edited and conformed to terms used in Lao PDR hydropower projects

1995 Mekong Agreement - agreement by Cambodia, Lao PDR, Thailand and Viet Nam that established the Mekong River Commission in 1995

3-phase power - a three-wire alternating current power circuit with each phase signal 120 electrical degrees apart

3S Basin - drainage basin for 3 large rivers in southern Laos & Cambodia with "S" names - Sekong, Sesan and Srepok

abatement - the reduction or elimination of something

abiotic - not biotic; inanimate; not having life

abutment - solid high ground against which a dam structure is constructed to resist movement

accretion - growth or increase by gradual accumulation

ac generator - an alternator

AC motor - alternating current motor

Acoustic Doppler Current Profilers - instruments used to measure water velocities, direction of flow and depth

acre - 1 acre is equal to about 4,000 square meters or .4 hectare

acre-foot - the volume of water that would cover one acre to a depth of one foot; 1 acre-foot = 43,560 cubic feet

active power - the amount of electric power in an alternating current circuit that is actually utilized; also called true power or real power

active storage - the portion of a reservoir that can be drawn down and used to generate electricity; also known as regulating capacity or live storage

adit tunnel - an underground passage used for access to a tunnel; used for ventilation, drainage, repairs, etc.

aerate - to force or introduce additional air into water

aeration weir - a weir designed to aerate the water flowing over it

aerator - a forced-air system used to aerate water

aerobic - relating to oxygen; needing oxygen to live

affermage - a type of lease where a lessee takes over operation of an enterprise while the assets remain the lessor's property

afforestation - the planting of new forests on lands without forests

aggregates - processed natural raw materials used for construction such as gravel, crushed stone and sand

air - a mixture of atmospheric gases and water vapor; natural air is about 78% nitrogen, 21% oxygen and 1% carbon dioxide and other gases

Air Quality Index - a numeric index that reports air pollution levels to the public

algal bloom or algae bloom - a rapid accumulation of algae in water systems which often causes a color change in the water

alluvial - regarding lands created by deposited sedimentary materials from rivers, floods, etc.

alternating current - electric current that reverses its direction of flow several times per second

alternator - an alternating current generator

American Wire Gauge - a US standard measure for the diameter of electrical wire and cable conductors

ampacity - the maximum current in amperes that a conductor can carry continuously without exceeding its safe temperature limit

ampere - a measure of electric current flow similar to the measure of water flow volume

amphibia - a class of vertebrates that live on land but breed in water such as frogs, toads, salamanders, etc.

Anadromous fish - fish that begin their life in freshwater, later migrate as juveniles to saltwater where they grow into adults and finally migrate back to freshwater to spawn

anaerobic - without oxygen; not requiring oxygen

angled bar racks - structural guidance systems used to direct migrating fish toward bypasses and safe passage past a hydropower dam

Annual daily peak flow - the largest daily flow of water recorded in a certain year at a certain location

Annual Recurrence Interval - the average annual rate of occurrence of an event

annunciator - indicator lights and alarms that alert human operators when an automated process changes to an abnormal state

anoxia - having an absence or near absence of oxygen

anoxic - having insufficient dissolved oxygen for healthy life

apparent power - the total amount of power in use in a system

appurtenant facilities - non-integral components of a hydropower producing facility such as substations and transmission lines

aquifer - an underground body of water located in saturated porous rock

arch dam - a type of dam with a curved wall facing upstream that directs reservoir water pressure to the side abutments

armature - the component of an electric motor that contains the main current-carrying winding

Association of Southeast Asian Nations (ASEAN) - an intergovernmental organization of 10 member countries in Southeast Asia

aquaculture - the breeding, growing and harvesting of fish and aquatic plants

aquatic biomonitoring - inferring the condition of rivers, lakes, streams and wetlands by examining the condition of organisms that live there

Arc Fault Circuit Interrupter - a device that senses power flow fluctuations in wire connections and breaks the circuit when dangerous sparking or arcing occurs

aseismic - not characterized by earthquake activity or other vibrations of the earth's crust

aspirator - a device for moving for removing fluids, commonly by suction

asynchronous - not synchronous; a condition when two AC electric systems do not have the same alternating current frequency and are out-of-phase

asynchronous motor (induction motor) - an alternating current motor where electric current in the rotor is obtained by electromagnetic induction

attraction flow - water flow supplied at a fish passage entrance that creates signals for fish to sense a safe passage route and entice them to use it

average return interval - the average annual rate of occurrence of an event

avulsion - a transfer of land from one legal owner to another when a change in the course of a borderline river moves land claims from one country to another

axial flow turbine - a type of turbine that has water flowing through it in a direction parallel to the turbine shaft

axial thrust - the unbalanced force acting on the rotor of a turbine that tends to displace the rotor along the axis of rotation

backwater effect - upriver effects caused by the impoundment of reservoir water behind a dam structure

baffles - rough fixtures placed on inner walls of a water channel to partially obstruct water flow and reduce flow velocities

baht - the monetary currency of Thailand

ball valve - a shut-off valve that controls the flow of water in a pipe by means of a rotary ball with a bore hole

Ban - Lao language term for a village in Lao PDR

bankable contract - type of contract that enables a new hydropower project to obtain reasonable financing and have tradeable value

bankable project - a hydropower construction project with contracts that give the project good profit potential

bar - a measure of water pressure with 1 bar being the force needed to lift water 10 meters in elevation

barrage (dam) - a type of dam with submerged gates that channels water flows through the structure

barrel (Imperial) - a unit of liquid measure equal to about .16 cubic meters or 36 imperial gallons

barrel (U.S.) - a unit of liquid measure equal to about 5.61 cubic feet or 42 U.S. gallons

base load - the amount of electric power needed to be supplied to the grid to meet demand

base load plant - a power plant that operates at full capacity continuously and sends maximum output into the grid

base load power generation - power generation intended to run continuously and send maximum output into the grid

basic project costs - a project's direct costs that exclude indirect costs and standard costs

basin - a region drained by a certain river and the tributary streams that flow into it, also called a watershed or catchment area

bathtub spillway - a type of double-sided channel spillway

Battery of Asia - term referring to Laos as the major electricity exporter to Southeast Asian countries

behind-the-meter systems - privately-owned renewable energy production systems located at homes or businesses

benthic - bottom-dwelling; describing fish species that prefer to feed and live at the lower levels of a water body

benthic zone - the lowest levels of a water body

bifurcation - division of water flow into two branches such as when one penstock flow is split to drive two water turbines

biocultural rights - a community's long-established customary right to be involved in the management of nearby lands, waters and resources

biodiversity - refers to all of the different kinds of life residing in a certain area

bioenergy - energy created by use of combustible organic materials such as biomass, biofuel and biogas

biofilm - a layer of microorganisms living on the inner walls of water pipes that slows flow velocity and causes inefficiencies

biofouling - undesirable biological accumulation of living organisms on surfaces exposed to water that causes inefficiency in hydraulic operations

biofuel - any fuel that is derived from biomass

biogas - gas which is produced from biomass

biomass - organic matter including wood, agriculture waste and other organic materials

biomonitoring - inferring the condition of rivers, lakes, streams and wetlands by examining the condition of the life that lives there

biosphere - the atmosphere near the earth's surface where life exists; also refers to all living organisms on planet earth

blackout - a complete power outage affecting many electricity consumers over a large geographic area for a significant period of time

black-start - the process of restarting a shut-down power station to full operation without relying on external electric power input

blade-strike survival - regarding fish survival rates from turbine blade-strike when fish pass through rotating turbine blades

boat lock (ship lock) - a navigation lock used for transit of boats past a hydropower dam structure

boilerplate provisions - commonly-used standardized provisions in a contract often placed at the end of the agreement

bombie - unexploded small bombs released from a larger cluster bomb

bonneted gate - a type of enclosed water gate used to regulate flow in dam outlets and remove silt through flushing

brackish water - water occurring in a natural environment with more salinity than freshwater but not as much as seawater

British thermal unit (Btu) - a measure of the heat content of fuels and energy sources; 1 Btu equals 0.000293 kilowatt hour

brownout - when an electricity provider decreases voltage on the grid and customers receive weaker than normal electricity

buckets (impulse blades) - curved buckets on a rotating turbine runner which are impacted by a water jet and spin the runner

build-own-operate-transfer (BOOT) - concession agreement that allows a developer to build a facility, have ownership, operate it for a certain time and transfer ownership to the government

build-operate-transfer (BOT) - concession agreement that allows a developer to build a facility, operate it for a time period and turn it over to the government

bulb turbine - a type of propeller turbine with the turbine and generator both sealed in a streamlined watertight bulb mounted in the center of the water passageway

bulkhead gate - a type of water gate used to isolate a certain area from water intrusion and primarily used for dewatering and maintenance

bus - an electric conductor or bar that serves as a convenient means of connecting switches and other equipment into various arrangements

busbar (bus bar) - a metallic bar used for electric power connections and distribution inside switchgear, panel boards and busway enclosures

butterfly valve - a type of valve that regulates water flow by a quarter-turn rotation of a disk and works like a ball valve for quick shutoff

buttress dam - a type of dam structure that transfers the load to foundation rock through footings; the weight of the structure itself provides sufficient resistance against movement

Buyer's Credit - a loan made by a lender to an importer for the purchase of imported goods while a finance agency guarantees the loan which eliminates the risk of nonpayment for the exporter

bypass - a channel or conduit through or around a dam structure that channels river flow and acts as a route for fish to pass without passing through the turbines

capability - the maximum load which a generator, turbine, apparatus or system can handle without exceeding acceptable limits of temperature, stress, etc.

capacitance - a measure of the capability of an object or device to store an electric charge

capacitor - a device that temporarily absorbs and stores electric energy by accumulating charges on two closely-spaced insulated surfaces

capacitor bank - several capacitors connected in series or parallel to form an energy storage system

capacity - the maximum load which a generator, turbine, transformer, transmission circuit, station or system is designed for

capacity charge - a fee paid by an offtaker for electricity output of a power plant being available for dispatch, regardless of whether power is actually taken

capacity factor - the ratio of the energy a power plant actually produces compared to what could be produced if it operated at full capacity

capacity reserve margin - is unused capacity available for use compared to peak demand; a capacity reserve margin of 15% is considered adequate

cap rate - capitalization rate - discount rate used in long-term valuation calculations

captive power plants - power plants that supply power to specific businesses only and not into a grid

carbon dioxide - a colorless greenhouse gas having a faint sharp odor and a sour taste

Carbon Dioxide Equivalent - uses carbon dioxide as the base for comparison of various greenhouse gases based on their global warming potential

cascade - a series of descending waterfalls, rapids or dams along a river

cascade management - when all dams in a particular cascade have their operations coordinated and managed together

cascade reach - the portion of a river reached and affected by the backwater-effect of impounded reservoirs

cascading failure - where failure of one part leads to the failure of other parts; domino effect

catchment area (drainage basin or watershed) - a common drainage system that channels runoff from rainfall into a certain stream or river

cavitation - noise or vibration caused by bubbles in the water that passes through a turbine; may cause damage to turbine blades

celsius - formerly known as Centigrade, a temperature scale with 0 degrees as freezing point and 100 degrees as boiling point of water

chain insulator - multiple insulators linked together to reduce power loss between an electricity conductor and a transmission tower

check dam - a small overflow dam used to slow water flows, reduce erosion, create ponds, act as stream crossing, etc.

circuit breaker - electric switching device that can automatically break the flow of electricity in a circuit

circular mil - a unit of area equal to the area of a circle with a diameter of one thousandth of an inch or 0.0254 mm

civil works - construction of weirs, dams, tunnels, canals, conduits, access roads and site improvements at a hydropower facility

Clean Development Mechanism - a system under the Kyoto Protocol that subsidizes non-polluting power plant production

closing structure - a dam, barrage or weir that blocks a river's water flow and creates a head pond or reservoir

coffer dam - a temporary water-blocking structure used to prevent water from interfering with new dam construction

cogeneration - the use of byproduct excess heat from a non-hydropower process to drive turbines and generate electricity

cold-load pickup - extra effort needed to resume electricity production after it has been off for a while

cold reserve capacity - reserve electricity generating capacity available for generation on demand

collecting gallery - a place where fish are guided to in a fish-pass system to assist their safe passage through a hydropower facility

comfort letter - a business letter from a 3rd party which assures the recipient that another party is able to meet the terms of a certain agreement

commercial operation date - the day when a new hydropower facility is deemed to be ready for full operation, often used as the start of a consignment period

committed energy - the combined amounts of primary energy and secondary energy that an energy producer declares to be available for offtake

commutator - a device that allows an AC generator to mimic a DC generator with electricity flowing in one direction only

computational fluid dynamic(s) - a numerical model which simulates fluid motion using computational methods

computerized numerical control - automated control of a machine or other device by use of a computer program

concession agreement - an agreement between a government and a private entity which grants business rights for a limited period of time

concessionary - when institutional lenders such as the World Bank are willing to make loans with easy terms to achieve their social goals

concession period - the number of years a concession agreement is to be in force

conductance - a measure of efficiency in conducting electricity

conductivity - a measure of efficiency in conducting electricity

conductor - material used to conduct electricity such as copper or aluminum

conduit - a pipe, tube, tunnel or channel used for conveyance of water

confluence - the intersection and merger of two rivers

connection fee - the initial cost for people to electrify their homes which includes outdoor connections, in-house wiring and a meter

consumer energy resources - privately-owned renewable energy systems located at homes and businesses; behind-the-meter systems

consumption - the end use and application of electric energy

control board - hydropower plants can be operated locally using a unit control board or remotely from a dispatch center

control panel - used for turbine and generator operation, load & voltage regulation and monitoring

core of power plant - turbine and generator set

counterpoise - mechanism that balances or neutralizes an undesirable situation

covenant - a formal binding provision in a contract or power purchase agreement

crest gate - a type of gate located on the crest of a spillway used to control water overflow

cross-flow turbine - operates with a nozzle that directs water against a cylinder runner with water flowing through the turbine blades twice

crowding mechanism - a way to move fish upstream over a dam by use of a crowding mechanism to push fish into and through a boat lock

crustacea - animals that live in water and have a hard outer shell such as lobsters, shrimps, crabs, etc.

cryogenic storage - storage of fluids at extremely low temperatures such as with Liquefied Natural Gas

cubic centimeter - a measure of volume equal to .061 cubic inches

cubic feet per second - liquid flow rate of one cubic foot per second or 450 gallons per minute

cubic foot - dry measure of volume equal to .0283 cubic meters

cubic feet per second - liquid flow rate equal to .0283 cubic meters per second

cubic inch - dry measure of volume equal to 16.38 cubic centimeters

cubic meter- dry measure of volume equal to 35.3 cubic feet; liquid measure of volume equal to 1,000 liters

cubic meters per second - liquid flow rate equal to about 35.3 cubic feet per second

cubic yard - dry measure of volume equal to .765 cubic meters

cumec - liquid flow rate equal to one cubic meter per second

cure period - the time period during which a defaulting party has a chance to correct a contract breach which would otherwise lead to a default

curing concrete - allowing newly-poured concrete to slowly harden while keeping the surface moist to obtain maximum strength

current (electric) - the flow of an electric charge through a conductor usually measured in amperes

cut slope - a slope in land created by site-work excavation

dam - a structure used to block water flow and impound water

dam cascade - where multiple dams are constructed on the same river, one above the other

dampener - a device that dampens and reduces the force of something

DC motor - direct current motor

dead flow - water not used for an intended purpose such as wastewater and oversupply of irrigation water to farmlands

dead storage - the volume of water in a reservoir below the lowest outlet which cannot be used to generate power or be removed by drainage

debt service - periodic principal and interest payments required to be made on debt

decimal degrees - method of expressing geographic position coordinates as digital notation instead of as degrees, minutes and seconds

decommissioning - the dismantling of a power plant and clean-up of the project site

Delft3D - a 3-dimensional modelling tool used to investigate hydrodynamics, sediment transport, morphology and water quality

deforestation - large-scale removal of nearly all trees from an established forest

deformation - changing or distorting shape by the use of pressure

degrees, minutes and seconds - traditional method of notation for geographic position coordinates

deloading - decreasing or reducing electric load demand

deloading rate - the rate at which a generator decreases electricity output

demand - the amount of electric energy desired to be received by consumers

demand-side management - efforts by utility providers to modify electricity demand with incentives for consumers to use less energy during peak demand hours

demining - removal of land mines and other unexploded ordnance

dendritic - having a branching form like a tree

derating - decreasing active production capacity

design head - the amount of head which a specific turbine is designed for to provide maximum efficiency

desilting basin - settling pond that allows suspended silt to settle out of water

dewatering - process of removing water from a certain place

diadromous - a general category describing fish that spend portions of their life in both fresh water and salt water

dielectric liquids - fluids used as electricity insulators in high voltage applications

dielectric material - insulating material often used for capacitors

diffuser - a device that diffuses and spreads something out in many directions

Dipterocarp / Dipterocarpaceae - a type of tropical lowland rainforest trees

direct current (dc) - electric current that travels in only one direction as contrasted with alternating current which reverses its direction of flow several times per second

discharge sluice - a water gate and channel that carries away water discharged from powerhouse turbines

dispatch - instructions issued by a control center to regulate electric power delivery from a producer to an offtaker

dispatchability - the ability of a power producer to increase or decrease output quickly on demand

dispatchable plant - a power plant that is capable of responding quickly to instructions from a control center to regulate its output

dispatchable power generation - electricity generation output that can be quickly and easily adjusted to efficiently manage a grid system

dispatch center (control center) - a facility where technicians guide and manage electric power generation and grid transmission

displacement - relocation of people away from their residence to allow construction of new hydropower facilities and inundation of lands

dissipate - to lessen an impact and cause it to slowly disappear

distributed energy resources - privately-owned renewable energy production systems located at homes and businesses; behind-the-meter systems

diversion system - a system used to divert water from its natural location and transport it to a powerhouse turbine

downramping - decreasing power production; powering down

draft tube - a water tube that carries water from a turbine runner to a tailrace

drawdown - the advancement of funds from a lender to the borrower in a construction loan as construction progresses

dry season months - the six calendar months from December to May in the Lower Mekong Basin

dynamic pressure or dynamic head - a measure of the force of water as it enters a turbine

dynamo - a device that converts mechanical energy from a rotating turbine shaft to electrical energy; also called a generator

earth dam - a type of dam structure in which more than 50% of the total volume consists of compacted earthen materials

earthing switch - a safety switch used to connect or disconnect equipment to grounded electrical conductors buried in the earth

ecosystem (ecological system) - the interaction of living organisms with non-living features in a certain geographic environment

efficiency - comparison of actual power produced to maximum power that could have been produced

effective head - a reduced value for hydraulic head when inefficiency losses such as friction are subtracted

Electricity du Cambodge (EDC) - the state-owned electricity utility responsible for electricity generation, transmission and distribution in Cambodia

Electricity du Laos (EDL) - state-owned electricity utility responsible for generation, transmission, distribution and services to customers in Lao PDR

Electricity of Vietnam (EVN) - Vietnamese state-owned electric power entity

electric current - the flow of an electric charge through a conductor or circuit, often measured in amperes

electric energy - energy derived from the movement of electrons from one point to another

electrical grounding - the process of safely directing excess electricity into the earth via a grounding wire to prevent injury and fires

electromagnetic - referring to electric currents that give rise to magnetic fields and magnetism

electro-mechanical works - turbines, generators, inlet valves and regulators, control systems, condensers, switchgears, protection systems, transformers, valves and pumps

embankment dam (earth dam) - a type of dam structure in which more than 50% of the total volume is formed from compacted earthen materials

endemic - regarding species found only in a specific geographic region

energy efficiency coefficient - the ratio between energy that is actually utilized for intended purposes compared to the total supplied

energy efficiency ratio - the ratio of output energy compared to input electrical energy

engineering, procurement and construction contract (EPC) - a contract in which a contractor designs, constructs and delivers a completed project, ready to use, on a turnkey basis

entrainment - occurs when fish are inadvertently drawn into a powerhouse intake structure and pass through a turbine risking blade-strike injury

environmental flow - the amount of water flow needed in a river to maintain a healthy ecosystem

environmental and social impact assessment (ESIA) - describes impacts that a new hydropower project will have on the environment and well-being of the people in affected areas

equity - ownership interest; the value of ownership shares in a company

equity-attributed capacity - the portion of a hydropower projects total capacity that can be attributed to each shareholder based on their ownership percentage

erosional wave - the slow loss of river-bottom sediments that progresses downstream over time after a new dam is built due to reduced sediment discharges

escrow account - an account where transaction funds are held by a 3rd party in trust while the parties complete a contract or agreement

estuarine - regarding an estuary or a partially-enclosed coastal body of brackish water with one or more rivers or streams flowing into it and a free connection to the open sea

estuary - a partially-enclosed coastal body of brackish water with one or more rivers or streams flowing into it and a free connection to the open sea

eutrophication - occurs when water becomes enriched with nutrients resulting in an increase in plant and algae growth

evacuate - to remove something or someone from a certain place

evapotranspiration - the transfer of water vapor to the atmosphere by evaporation or transpiration from plants

excitation system - a system that provides a DC current to the field windings of a generator to produce a magnetic field for electric power generation

exciter - a small generator that supplies the magnetic field for the main generator

execution date - the date on which a legal agreement is signed by all parties and becomes effective

extirpation - the localized extinction of species

Fahrenheit (F) - a temperature scale with the boiling point of water at 212 degrees and its freezing point at 32 degrees

fathom - a measure of water depth equal to 6 feet or 1.83 meters

fauna - all the animal life in a certain region or habitat

fertilizer - a chemical or natural substance added to soil or land to increase its fertility such as nitrogen, phosphorus and potassium

fill dam - a type of dam made entirely of compacted earthen materials such as soil and crushed rocks

firm energy - a guaranteed minimum supply of energy to be delivered by a power producer to the offtaker or incur penalties if not supplied

fish crowder - a device that guides fish to safe-passage transit route at a hydropower dam

fish elevator - mechanism where fish are encouraged to swim into a collection area, then nudged into a device that lifts them into waters on the upper side of a dam

fish guiding - guiding fish to safe passage transit routes at a hydropower dam

fishing gear - major types used in Lao PDR are hook and line, gill nets, lift nets, scoop nets, seine nets, cast nets & basket traps

fish ladder - a series of stepped pools that allow fish to swim upstream and transit a dam structure

fish lift or fish elevator - mechanism where fish are encouraged to swim into a collection area where they are nudged into a device that lifts them into waters above a dam or barrier

fish lock - operates like a navigation lock for boat passage; it attracts fish into a lock chamber and releases them at a different water level on the other side of a dam structure

fish migration facilities - are intended to sustain the life cycle and populations of long-distance migratory fish found in the part of the river where the dam is located

fish pass - any conduit, channel, lift, device or structure which helps migrating fish transit a blocking structure, upstream or downstream

fish passage - method that allows fish to swim past or through hydropower project barriers on a river, passing either upstream or downstream

fish screen - a barrier installed to divert downstream-migrating fish into a safe bypass around a dam or other blocking structure

fishway - any structure created to facilitate safe and timely fish transit past an obstacle, allowing fish to move through a water system

flap gate - a water flow gate hinged at the top and opening one-way only, often placed in a water channel to close automatically on reversal of flow

flood gate - a water flow gate used to allow and control flood releases from a reservoir

flood pulse - the natural cycle of periodic seasonal floods on a river

flood season months - the four calendar months from July to October in the Lower Mekong Basin

flood storage capacity - the portion of reservoir capacity reserved for the temporary storage of floodwaters

flora - all of the plants in a particular region or habitat

flow rate - is the volume of water flowing by a certain place in a given amount of time, usually expressed as cubic meters per second

flow volume - is the volume of water flowing by a certain place in a given amount of time, usually expressed as cubic meters per second

flume - an open chute with side walls for conveying water

flushing (of sediment) - removal of sedimentation from reservoirs and impoundments by hydraulic flushing or other means

flushing effect - sediment flushing causes a reallocation of sediments in the impoundment with habitat destruction and loss of food sources for fish and other aquatic organisms

fluvial processes - are processes associated with rivers and streams and the deposits and landforms created by them

foot (feet) - 1 foot = 12 inches or .3048 meters; 3 feet = 1 yard; 5,280 feet = 1 mile

footprint - is the area impacted by an event or the extent of its negative impact

Force majeure - a term for unforeseeable and uncontrollable circumstances that prevents someone from fulfilling a contract (such as war, flood, earthquake, change in law, etc.)

forebay - the water impoundment immediately above and upriver from a dam structure

fossil fuel - organic fuel such as oil, coal, natural gas and their by-products that was formed in prehistoric times from the remains of living-cell organisms

fragmentation - the separation of wildlife populations due to construction of new hydropower facilities, transmission lines, reservoirs and access roads

Francis turbine - a type of reaction turbine that can be positioned horizontally or vertically and is comprised of a runner with fixed blades, scroll case, wicket gates and a draft tube

free board - extra height of a canal sidewall that allows water flows to exceed the original design flow

free-flow turbines - utilize flowing water's natural pathway and do not require diversion of water through man-made channels or pipes

friction loss - for piped water there is friction between the water and the inner surface of the pipe or conduit which causes pressure drop while the water is moving

fuse box - a metal box that contains electric fuses that act as safety circuit breakers

fusegate - a set of units placed on a weir sill or spillway crest to form a watertight barrier that raises the height of the sill or crest and creates additional storage capacity in the pond or reservoir

Gabion weir - a type of permeable weir structure composed of rip-rap materials formed into steps and held together by wire mesh

gallery or collecting gallery - a place where fish are guided to in a fish-pass system at a hydropower dam; for guiding them to a safe transit route

gallon - a unit of fluid volume; a U.S. gallon equals 231 cubic inches or 3.785 liters or .8327 Imperial gallons

gallons per minute - a liquid flow rate equal to one gallon per minute or about 3.79 liters per minute

galvanometer - a device used on electrical circuits to measure the intensity and direction of an electric current

Gantry crane - a type of sliding overhead crane used to lift and move objects from above

gauging station - a sensing station that measures water flow by continuously recording the water level

generating capacity (installed capacity or nameplate capacity) - the maximum rated output of an electricity generator

generation - the process of converting different forms of energy such as kinetic, thermal, mechanical, chemical or nuclear into electrical energy

generator - also called a dynamo; a device that converts mechanical energy into electrical energy

genset or generator set - a portable electric power generator

geomembrane - a type of porous material applied in sheets as a liner to control fluid migration

geomorphic - relating to the earth's surface

geomorphological - relating to the form of surface features on planet earth

geopolitical - relating to international political relations as influenced by geographical factors

gigawatt (GW) - a measure of electric power equivalent to 1,000 megawatts or 1 million kilowatts

gigawatt-hours (GWh) - a measure of the amount of electric energy flowing over time equivalent to 1,000 megawatt-hours

global warming - the gradual long-term increase in the temperature of earth's surface caused by greenhouse gasses introduced into the atmosphere from human activities

global warming potential - a system used to quantify greenhouse gas global warming potential using carbon dioxide as the base for comparison

governor - a device that regulates turbine speed by adjusting water flow to the turbine which affects rotation speed and output and allows synchronous output into a grid

gravity concrete (gravity mass concrete) - a type of concrete structure where the weight of the structure materials itself is considered sufficient to resist external forces

Greater Mekong Subregion (GMS) - comprises Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam along with the Guangxi Zhuang Autonomous Region and Yunnan Province in China

Greenfield hydropower project - a new hydropower plant built in an area that doesn't have adequate existing power plants

greenhouse effect - when certain transparent materials allow short wavelength radiation penetration and block radiation of longer wavelengths, it may lead to a heat build-up within the space enclosed by such a material on sunny days

greenhouse gas - any gas that absorbs infra-red radiation in the atmosphere such as carbon dioxide, methane, nitrous oxide, halogenated fluorocarbons, ozone, perfluorinated carbon, and hydrofluorocarbons

grid - a regional or nation-wide network of high-voltage electric transmission lines that brings power to users from sources such as hydropower plants, wind turbines and solar panels

grid code - the technical specifications which a facility connected to a public electric grid has to comply with to ensure safe, secure and proper functioning of an electric system

ground disconnect - an earthing switch used to connect equipment to electrical conductors buried in the earth for safety

grounding - electrical grounding is the process of safely directing excess electricity to the ground (earth) via a grounding wire and grounding rod so that the excess (such as a lightning strike) doesn't cause injury or fires

grounding electrode conductor - a bare copper wire that connects the neutral/ground bus bar to a ground rod driven into the earth near the service panel which allows stray electrical current (such as a surge created by lightning) to pass safely into the surrounding soil

grounding rod - a conducting metal rod connected to a grounding wire that is placed in the ground to safely remove excess static electricity and external high voltages like lightning strikes

ground fault - an inadvertent contact between an energized conductor and ground or a grounded equipment frame that may trip a circuit breaker

groundwater - underground water contained in saturated porous rock zones beneath the land surface

habitat - the natural home and environment of animals, plants and other organism

habitat fragmentation - the separation of wildlife populations from each other due to construction of new hydropower facilities, transmission lines, reservoirs and access roads

harmonic distortion - an undesirable change in the waveform of an electricity supply voltage that causes distortion such as flickering lights

harmonics - used to describe a distortion in the fundamental voltage and/or current waveform within an electric system

head - the difference in elevation between the intake level and the discharge point of water flowing through a hydropower plant

head pond (intake pond) - a reservoir created behind a small dam or weir from which water is taken to a powerhouse to drive turbines

headrace / headrace channel - a conduit that conveys water to a penstock for the driving of turbines in a powerhouse

head tank or surge tank - a water storage tank at a headrace tunnel used to dampen harmful effects when turbine valves are closed suddenly and the incoming water under pressure creates a vibrating effect that may damage the pipe

headwater - the upper catchment area of a river or stream; also can refer to impounded water located at the upstream side of a dam structure

headworks - a generic term for structures, pipes, channels and other works located above a hydropower plant that channel water toward the turbines and generating equipment

Health Impact Assessment - a study that describes impacts which a new hydropower project may have on the health and well-being of the people in affected areas

hectare - 1 hectare is equal 10,000 square meters or 2.5 acres or 6.25 rai (Thailand)

helical - spiral shaped

hermetically-sealed - sealed tightly for safe submersion in water without intrusion

Hertz - the standard unit of electric alternating current frequency, commonly stated as cycles per second

Horsepower (HP) - a unit of measure for the rate of doing work; one horsepower equals about 745.7 watts

Houay / Huay - Lao language term for a stream or small river that may not have water flow in the dry season

hungry water - sediment-deficient water released into a river from a dam's reservoir causes "eating away" erosion of downstream channel beds and banks

hybridization - combining the qualities of two different systems into one such as installing floating photovoltaic panels on a hydropower reservoir

hydration - adding, providing or absorbing water

hydrate - to add, absorb or provide with water

hydraulic transients - pressure surges are created when sudden changes in flow rates of water occur in pipes and the pressures created may be high enough to damage pipelines

hydraulics (fluid mechanics) - a mechanical function that operates through the force of liquid pressure

hydro - a combining word form meaning water

hydroacoustics - the study of sounds travelling through water; a method of surveying fish populations by analyzing the sounds created by fish movements

hydrobiology - the study of biology contained in bodies of water; the science of life and life processes in water

hydrocarbons - organic chemical compounds composed entirely of hydrogen and carbon atoms

hydro-connected solar - solar power development located on the property of a hydropower facility

hydrodynamics - the study of water in motion

hydroelectric power - power generated by capturing some of the potential energy of falling water by use of a turbine to spin rotating magnets in a magnetic field and induce an electric current

hydrogenerators - hydropower generators that convert the mechanical energy from a spinning turbine shaft into electrical energy using an excitation system

hydrokinetics - using a device to harness energy from a flowing stream of water and convert the hydrokinetic energy into mechanical energy

hydrokinetic conversion device - a device used to extract some of the kinetic energy from a flowing stream of water and convert it to mechanical energy

hydrokinetic turbine - a turbine that transforms some of the kinetic energy of a falling stream of water into mechanical energy

hydrologic - regarding the circulation, distribution and conservation of planet earth's water resources

hydrologic cycle or water cycle - the global cycle of sunlight causing water evaporation from lakes and oceans which forms into clouds that precipitate as rain or snow with the runoff finally flowing back to the ocean

hydrology - the scientific study of the movement, distribution and management of water

hydrometeorological - regarding transfers of water and energy between land surfaces and the earth's lower atmosphere

hydrometeorology - a branch of meteorology and hydrology that studies the transfer of water and energy between land surfaces and the earth's lower atmosphere

hydrometric - regarding the monitoring of components of the hydrological cycle such as rainfall, groundwater characteristics, water quality and flow

hydrometry - monitoring of components of the hydrological cycle including rainfall, groundwater characteristics, water quality and flow characteristics of surface waters

hydropeaking - method of operating a hydropower plant to generate more power in peak-demand hours and less in non-peak hours

hydropolitics - the study of conflict and cooperation between states over transboundary water resources

hydropower - conversion of some of the gravitational kinetic energy in flowing water to create mechanical energy that drives turbines and generates electricity

hydrosocial - regarding the social, environmental and political dimensions of water resources usage over space and time

hydrosocial cycle - the process by which water and society influence and transform each other in a circular manner over space and time

hyperbolic - exaggerated in form; seeming larger than actual

impedance - the resistance in an alternating electric circuit due to the continual reversal of flow

impeller - the rotating component of a turbine, pump, fan, etc.

impoundment - (noun) a pond or reservoir confined by a dam, dike, floodgate or other artificial barrier

impoundment - (verb) the action of creating a pond or reservoir by flooding land that was previously not covered by water

impulse turbine - a turbine that uses a high-velocity water jet to rotate a turbine shaft with blades

incandescent lamp - an electric lamp in which a filament is heated by an electric current until it emits visible light

incident controller - the person or group in charge of dealing with an undesired incident such as a breakdown or shutdown

incident response team - a special group formed to deal with an undesired incident such as a breakdown or shutdown

inertia - a property of matter by which it remains at rest or in uniform motion unless acted upon by some external force

independent power producer - a privately-owned energy producer involved in the business of generating electricity for sale and profit

Indochina - refers to mainland Southeast Asia; the combined lands of Singapore, Malaysia, Thailand, Cambodia, Laos, Vietnam and Myanmar

Indochinese Peninsula - mainland Southeast Asia; the combined lands of Singapore, Malaysia, Thailand, Cambodia, Laos, Vietnam and Myanmar

induction - a process where a change or movement of a magnetic field around a conductor induces a voltage current in the conductor

induction motor (asynchronous motor) - an alternating current motor where electric current in the rotor is obtained by electromagnetic induction

Initial Environmental Examination - a study that describes impacts that a new hydropower project may have on the environment and well-being of people in affected areas

installed capacity (nameplate capacity or generating capacity) - the maximum electric output of a generator in normal operating conditions

insulator chain - multiple insulators linked together to reduce lost power between a high-voltage electricity conductor and a transmission tower

intake - the structure in a reservoir that takes in water and channels it to drive turbines at a hydroelectric plant

intake pond or head pond - a reservoir behind a small dam or weir from which water is taken to a powerhouse to drive turbines

intake screens - devices such as bar racks or trash racks installed in front of water intakes to keep unwanted items from flowing in

intake structure - the structure that takes in water from a reservoir or river to drive turbines at a hydroelectric power plant

integrated control panel - used to perform integrated control of turbine and generator operation, load & voltage regulation and monitoring in a hydroelectric facility

integrated demand side management - using all the resources utilities have at their disposal to plan, generate and supply electricity in the most efficient manner possible

intermittent energy - energy that is not continuously available due to factors outside of direct control such as wind or solar energy production

inundation - the condition of being flooded and covered with water

invertebrates - animals that have no spine or backbone

inverter - a device that converts direct current (DC) power to alternating current (AC)

Joule - a measure of energy equal to one watt of power delivered for one second; it takes 1,055 joules to equal one British thermal unit

Joule effect - refers to energy loss when electricity is transmitted over electric lines and heat loss occurs in the conductors

juristic person - an entity such as a corporation or joint venture that is recognized as having a legal personality under the law

Kaplan turbine - a type of propeller turbine that allows adjustment of the wicket gates and the angle of the blades, often used for low head operations with small output

kilo - a decimal unit prefix in the metric system denoting one thousand or multiplication by one thousand

kilogram (kg) - measure of weight equal to 1,000 grams or 2.2 pounds

kilometer (km) - measure of distance equal to 1,000 meters or 1093.6 yards

kilovolt (kV) - one thousand volts

kilovolt-ampere (kVA) rating - a ratio of a generator's output in kilowatts divided by the power factor; in a 100% efficient system $kW = kVA$

kilowatt (kW) - a measure of electric power equal to 1000 watts or 1.341 horsepower

kilowatt-hour (kWh) - a measure of electric energy; the equivalent of 1000 watt-hours

kinetic energy - gravitational energy in hydropower terms; the energy potential of water that can be partially captured as it flows to a lower elevation

kip - the monetary currency of Lao PDR

Kyoto Protocol - an international framework intended to reduce earth's greenhouse gas emissions by subsidizing the construction of new non-polluting power plants

lacustrine - regarding a pond, lake or reservoir

Lancang - Chinese name for the Mekong River inside China

Lancang Cascade - refers to the mainstream Mekong/Lancang dams in China

Lancang Jiang - Chinese name for the Mekong River inside China

Lancang-Mekong Cooperation - framework for cooperation between states of the Lancang/ Mekong River to boost trade between China, Myanmar, Thailand, Laos, Cambodia and Vietnam

Lao Cascade - all of the mainstream Mekong River hydropower projects located within Lao PDR or on its border

Lao(s)-China Railway - railway system in Laos where all of its passenger trains are powered by hydroelectric power

Lao Holding State Enterprise - a Lao PDR governmental entity that holds some of the state's ownership interests in hydropower projects

latitude - hypothetical curving horizontal lines around planet earth that express distance north or south of the equator in degrees, minutes and seconds (or in decimal form)

lessee - the party or person that rents property from the owner or lessor

lessor - the owner or party that rents property to a lessee

letter of credit - a letter issued by a bank to an overseas seller that guarantees payment in a cross-border transaction, eliminating the risk of nonpayment

levelized cost - the present value of lifetime production costs divided by lifetime units of energy produced with the result indicating levelized cost per unit

levelized cost of energy - the present value of lifetime production costs divided by lifetime kilowatt hours produced; used to compare kilowatt hour cost for different types of power production

light-penetrating effect - where sunlight penetration into water is increased due to a reduction in suspended sediments or decreased flow velocity of the water

limnology - the study of inland waters including lakes, reservoirs, rivers, streams, wetlands and groundwater

liquefied natural gas (LNG) - natural gas that has been condensed to a liquid form by cooling to about minus 260 degrees Fahrenheit

liquefied petroleum gas (LPG) - a mixture of gaseous hydrocarbons, mainly propane and butane, that change into liquid form under moderate pressure

liter (litre) - a metric unit of capacity equal to about 33.8 fluid ounces

liters per minute - liquid flow rate equal to one liter per minute or about .264 gallons per minute

lithology - the study of the general physical characteristics of rocks

littoral - refers to the area of a waterbody closest to shore where sunlight penetrates the water enough to reach sediment and support growth of aquatic flora

live storage or active storage - the portion of a reservoir that can be drawn down and used for power production, flood control, navigation and downstream releases

load - the combined amount of electrical energy required to meet customer demand in a certain system at any moment

load center (service panel) - an enclosure that serves as a distribution point for electricity and contains the main breaker and branch circuit breakers

load dispatch center - a central authority that manages and controls power inputs into the grid

load electrical - the total amount of electricity on a specific power system required to meet customer demand at any moment

load factor - the ratio of the average load during a certain period of time to the peak or maximum load occurring in that period

load following - situation where power generation is adjusted throughout the day in response to fluctuating demand for electricity

load-following plant (intermediate peaking plant) - a power plant that varies output to closely match changing energy demand

load-serving entity - a company or other organization that supplies electricity to a customer

load shedding (rolling blackouts) - temporary cut off of power supply to some customers to avoid overloading of the entire system when demand exceeds supply

load shifting - adjustment of a hydropower plant's output to match varying demand throughout the day

lock (navigation lock) - a structure in a river or waterway that allows navigation passage for boats to transit between two waterways that are not at the same level

lock fish passage - using a boat navigation lock for fish passage by moving a screen through the lock which drives fish into and through the lock along with boats

log boom (trash boom) - a floating rope-like device placed in reservoir water to block logs and other unwanted materials from entering water intakes

longitudes - hypothetical vertical curving lines around planet earth that express distance in degrees, minutes and seconds (or in decimal form) east or west of a line that passes through Greenwich, England

louver racks - angled bar racks and louvers used to guide migrating fish toward fish passages and sluiceways at hydropower plants

Lower Mekong Basin - the Lao, Thai, Cambodian & Vietnamese portions of the Mekong River and its drainage basin

magnetic flux - a measurement of the magnetic field which passes through a given area

manifold - the section of a pipeline that divides water flow from a single pipe into multiple smaller pipes to distribute and feed multiple turbines

marginal loss - the increase in power distribution losses resulting from each additional unit of electricity distributed

marine energy - energy derived from naturally-moving water to produce renewable power from rivers, ocean currents, waves & tides

megavolt ampere - a measure of bulk power with one megavolt ampere equal to one megawatt

megawatt (MW) - a measure of bulk power; the equivalent of 1,000 kilowatts or 1 million watts

megawatt-hour (MWh) - the equivalent of 1,000 kilowatt hours; a 1,000-megawatt power plant running at full power for one hour produces 1,000 megawatt-hours of electricity

Mekong Dam Monitor - an online platform managed by the Stimson Center that uses remote sensing, satellite imagery and GIS analysis to provide near-real time reporting of hydrologic indicators in the Mekong River Basin

merchant power plant - a power plant that sells its output of electricity to a competitive wholesale market

meter (metre) - a measure of length equal to 1.0936 yards

metric ton - a unit of mass or weight in the metric system equal to 1000 kilograms

methane - a potent greenhouse gas that can be created from decomposition of underwater vegetation in inundated areas

micro hydro - very small hydropower projects that generate less than 100 kilowatts output

mil - a measure of length used to measure wire conductor sizes (without the insulation) equal to one thousandth of an inch or 0.0254 mm

mile - a distance measure equal to 1769 yards or 1609 meters or 1.609 kilometers

miter gate - boat transit lock gates that swing out from the side walls and meet at an angle pointing toward the higher water level

mitigation - the lessening or reduction of something harmful and its harmful effects

mobile commons - refers to waters in transboundary rivers and the sediments that water carries in hydropower situations

mole drain - an underground cylindrical drainage channel cut by a special plow to drain excess water from heavy agricultural soil

Mollusca (Mollusks) - a class of soft-bodied spineless creatures protected by a hard shell, such as snails, scallops, oysters, etc.

monoculture - a cultivation system of only one type of plant or organism

montane ecosystems - stratified ecosystems found on the slopes of mountains where temperatures cool as elevation increases

morphology - the study of shapes and forms of things and how they may have evolved and changed

multi-level intake - a type of water intake structure that is able to draw water from more than one level of a reservoir

nam - Lao language term for river or water

nameplate capacity (installed capacity or generating capacity) - the maximum output of a generator or generating plant in normal operating conditions

nappe - a sheet of water that flows over a weir or dam

natural gas - hydrocarbon gases found in the earth composed of methane, ethane, butane, propane and other gases

navigation lock - a structure in a river or waterway built to allow safe navigation passage for boats between two waterways that are not at the same level

nephelometer - an instrument used to measure the turbidity of water

nephelometric - regarding the measurement of water turbidity using an instrument called a nephelometer

net head (effective head) - is equal to gross head minus the efficiency losses of the channeling waterways

net metering - occurs when electricity consumers who operate their private energy generators receive credit for the electricity they generate and place into the grid system

Newton's Law - for every action there is an equal and opposite reaction

nexus - a connection or causal link

nitrogen - a colorless, odorless and tasteless gas that is the most plentiful element in Earth's atmosphere and is a constituent of all living matter

non-concessionary loan - a loan with a market-based interest rate and substantially less generous terms than a concessional loan

non-dispatchable technologies - technologies where power is not available on demand but only when the energy source is available such as from wind and solar

novation - an agreement between contracting parties that allows the substitution of a new party for an existing one

nutrient load - the amount of nutrients contained in water and usually bound to suspended sediments

OCR Rate - Official Cash Rate of interest on loans, often used in the past by the Asian Development Bank

off-take - to purchase and receive electric power from a producer

off-taker - a purchaser and receiver of electric power from producers

ogee - a serpentine-like shape with a double curve

ohm - the unit of electrical resistance in the International System of Units

operating water head - the difference in elevation between the surface water level at the head pond and the tailrace

oscilloscope (O-scope) - an electronic test instrument that displays varying electric current voltages as a two-dimensional plot of signals over time

out-of-phase - a condition when two AC electric systems do not have the same alternating current frequency and are not synchronized

overshot gates - dam crest gates on a hydropower dam structure that control overflow releases from the impoundment

ozone - an inorganic molecule with a pale-blue gas color and a pungent smell

peaking - the mode of operation of a power plant where power production is varied to match electricity demand over time

peaking capability - the maximum peak load that can be supplied by a power generating unit in a stated time period

peaking capacity - the maximum peak load that can be supplied by a generating unit, powerplant or power system in a stated period of time

peak load power generation - refers to the mode of operation of a power plant where power is produced to match electricity demand over time

Pelton turbine - a style of turbine preferred for use in high hydraulic head and low volume situations

penetration - the amount of electricity generated by a single source compared to the total generated by all sources

penstock - a closed conduit or pipe that carries water under pressure to drive turbines in a powerhouse

permeable - having the ability to allow liquids or gases to pass through it

perpendicular - being at a 90 degree angle position to another connecting line; two perpendicular lines form a right angle

pH - a number used to express acidity and alkalinity on a scale where values run from 0 (highest acidity) to 14 (highest alkalinity) with 7 being neutral

phosphorus - a poisonous yellowish-white non-metallic chemical element that glows and burns when in contact with air; useful as fertilizer

photovoltaic cell or solar cell - a device that converts sunlight energy into electricity by photovoltaic effect

photovoltaic floating - technology in which solar cell systems are situated on structures floating on bodies of water

phytosanitary - relating to the health of plants, especially regarding the requirements for imports of agricultural products

phytosanitary certificate - verifies that agricultural products have been inspected and are free of pests and disease

pick-up rate - the percentage of residential households that have electricity grid connections in a certain area

pico hydropower - a term referring to very small-scale hydropower plants with electrical output of five kilowatts or less

piezometer - a device used to measure fluid pressure in a system

pit turbine - a variation of the bulb turbine that has application in the head range of 1.5 to 10 meters and unit capacity below 15 MW

plant capacity factor - the ratio of actual power output compared to the total amount that could have been produced under ideal conditions

plant factor - the ratio of the energy that a power plant produces to the energy that could be produced if it were operated at full capacity

plunge pool - a pool used to dissipate and lessen the impact of falling water to avoid excessive erosion

pneumatic - operated by air or gas under pressure

political ecology - analyzes the complex interaction between humans and natural ecology

polluting power plant - a power plant that produces and releases significant amounts of harmful greenhouse gases into the atmosphere

pollution standards index - a numerical index used for reporting the severity of air pollution levels to the public

porosity - a measure of the empty spaces within a material and the ability of that material to absorb liquids

potable water - refers to good quality water used for sanitary purposes such as drinking, showers, cooking, etc.

potassium - a silvery-white metallic element that oxidizes rapidly in contact with air and whose compounds are used as fertilizer

potential energy - energy in a stored form available for use such as the gravitational energy of water at an elevated level

pounds per square inch - a unit of pressure equal to one pound of force applied to an area of one square inch; 1 foot of water head = 0.43 psi of pressure

powerhouse - the physical structure of a hydroelectric generating facility that contains turbines, generators and hydroelectric control equipment

power grid - a system of transmission lines, transformers and stations used to transmit electricity to consumers and ultimate users

power factor - a measure of the energy loss due to the constant reversal of current flow in an alternating current circuit; a power factor of 97% is common

power system stabilizer - a device connected to a generator to improve damping and stability of a power system

preferential buyer's credit - a low-interest loan made by a lender to an importer with a finance agency guaranteeing the loan, eliminating the risk of nonpayment for the exporter

preparatory survey - a comprehensive description of a proposed new hydropower facility

pressure shaft - a conduit for water under pressure

pressure surges - are created when sudden changes in flow rates of water occur in pipelines and may be high enough to damage or even cause failure of pipelines

pressure tower (surge tower or surge tank) - a water tank containing a column of water used as a pressure neutralizer to dampen pressure variance in a penstock

pressure tunnel - a lined or unlined underground tunnel used as a conduit for water under pressure

primary energy - electric energy that is declared by a producer to be ready for dispatch from the generating plant

Programmable Logic Controller - a computer program used to automate electro-mechanical processes at hydropower plants

project completion report - a report used for accountability and learning, to look back at a completed project and see how things could have been done better

project development agreement - an agreement between a government and a hydropower developer for the development, construction and operation of a hydropower project

propeller turbine - a type of turbine with three to six blades where flowing water contacts all of the blades constantly

protocol - a formal system of rules and procedures to be followed in certain situations

pumped storage hydropower - a hydropower system that pumps water from a lower to an upper reservoir for storage and later power generation

race - a channel that transports water away from hydraulic apparatus such as a tailrace that takes flows out of a powerhouse

radial flow turbine - a type of turbine where water flows into a turbine at a 90 degree angle to the rotating shaft

radial gate - a water control gate with a curved upstream plate and swinging radial arms hinged at their base

radial thrust - in hydraulic pumps, the summation of unbalanced impeller forces acting in the radial direction

rai (in Thailand) - 6.25 rai equals 1 hectare

ramping capability - the ability of a power plant to efficiently scale-up and scale-down its power output

ramp rate - the maximum allowable rate of change in output from a power plant that will continue to prevent undesirable effects from rapid changes

ramp-down period - shut-down period; the time it takes to shut down a hydropower-generating operation completely

ramp-up period - start-up period; the time it takes to activate a hydropower-generating operation and reach full operating level

Ramsar site - a wetlands site of international importance under the Ramsar Convention, also known as "The Convention on Wetlands"

rated capacity - the name plate ratings of electrical apparatus; the maximum load that a generator, turbine, transformer, apparatus, station or system is designed for

rated head - the net hydraulic head which a turbine is designed for and which efficiently matches a generator's rated output

reactance - the opposition to alternating current flow caused by inductance and capacitance from the continual reversing of flow which creates conducting inefficiencies

reaction turbine - a term for hydraulic turbines where water enters under pressure, interacts with the turbine runner and rotates the turbine shaft

reactive power - some of the alternating current electric power that flows back into the source due to the continual reversal of flow which creates conducting inefficiencies

reforestation - re-establishing native tree cover on lands that were previously forested but currently have less than ten percent tree canopy cover

regeneration of forest - the act of renewing tree cover by establishing young trees promptly after a previous stand of forest has been removed

Regional Grid Code - a multi-national electricity transmission code that coordinates governance, connections, operations, metering & operations in a certain region

regulating capacity or live storage - the portion of a reservoir that can be drawn down and used for flood control, power production, navigation and downstream releases

regulating dam - an auxiliary dam and pond located downstream of a power plant used to store discharged water and release it gradually to even-out downstream flows

regulating pond or re-regulating pond - a pond created not far below the discharged outflow from turbines to store water and gradually release it to even-out downstream flows

reinforced concrete - cement which has rebar or metal mesh embedded in it to strengthen the cured concrete

relocation or resettlement - relocation of people away from their residence to allow construction of new hydropower facilities and inundation of lands

renewable energy - energy that can be captured from an endless constantly-recharging system such as from the earth's water cycle, sunshine, wind, tidal or geothermal

renewable energy project - a project that generates energy from a renewable energy source such as hydropower or solar

re-regulating dam - an auxiliary dam and pond located downstream of a power plant used to store discharged water and release it gradually to even-out downstream flows

reserve - additional unused capacity of a power system available to be used for dealing with abnormal contingencies

reservoir - a body of water impounded on a river or stream behind a dam, weir or other blocking structure

reservoir active storage (active volume or live storage) - the portion of a reservoir that can be drawn down and used for flood control, power production and downstream releases

reservoir dead storage - the portion of a reservoir that can not be used for flood control, power production or downstream releases

reservoir stratification - the layer-like variation in temperature and quality of reservoir water as upper water is warmed by the sun and rises while colder water sinks to lower levels

resettlement - relocation of people away from their residence to allow construction of new hydropower facilities and inundation of lands

residence time - the time it takes for flowing water to transit the entire length of a cascade reach or other river section

resistance (electrical) - the property of all electric conductors to resist the flow of current and convert some of the energy into heat

resistive losses - energy transmission loss in conductors due to resistance which turns some of the flowing energy into heat which is lost

reversible pump/turbine - a dual-purpose hydraulic device that operates as a pump in one direction of rotation and as a turbine in the opposite direction

revetment structures - riverbank structures installed to reduce or eliminate erosion from flowing water

riffles - the shallower and faster-moving parts of a stream or river

riparian area - the area that connects and interfaces a river or stream with nearby land

riparian communities - communities situated along a river or lake shore

riparian rights - traditional rights that attach to waterfront property by virtue of that property being at the edge of the water

ripple effect - occurs when a disturbance to a system spreads outward to disturb an increasingly larger portion of the system similar to ripples in a pond

riprap - large stones or concrete chunks placed on a slope to protect the slope from erosion

River Continuum Concept - a model for classifying and describing flowing water based on width, depth, velocity and sediment load while taking into account biological factors

riverine - regarding a river; resembling a river; located near a river

River Information System - provides timely info to aid safe river travel by reporting water levels, oncoming vessels size and speed, incidents and accidents, weather forecasts, etc.

roller-compacted concrete - a type of concrete with the same ingredients as conventional concrete but is applied as a drier mix and compacted by heavy rollers

rolling blackouts or load shedding - temporarily cutting off power supply to certain customers to avoid overloading the entire system when demand for electricity exceeds supply

rotating-armature generator - consists of a rotating armature that rotates between two magnets and generates an electromagnetic force current

rotating-field generator - in this design the armature is stationary and the magnets rotate around the stator creating a magnetic field that generates electromagnetic force

rotor - the rotating inner component of a generator consisting of windings surrounding the field poles

runaway speed - the maximum rotational speed that a certain turbine can theoretically attain

run-of-river - a type of hydropower project that allows river flows to pass through the project at roughly the same rate and time as the natural flow of the river

runner - a part of an impulse turbine connected to the rotating shaft as a circular disc with blades on one side

runoff - the portion of fallen precipitation that forms into streams and rivers as it flows over the land surface

saddle dam - an auxiliary dam constructed on the perimeter of a reservoir to confine the reservoir at a higher level and create more reservoir storage capacity

saline - regarding water that contains a high concentration of dissolved salts

salinity - the degree to which water contains concentrations of dissolved salts

sand flushing gate - a gate near the bottom of a dam structure used to release water from a reservoir in a way that helps scour and flush out accumulated sediments near the gate

scoping phase or stage - the initial stage of a new or proposed hydropower project where people can get a detailed understanding of the project

scour gate - a gate near the bottom of a dam structure used to release water from a reservoir in a way that helps to scour and flush out accumulated sediments near the gate

scouring - occurs when fast-moving water erodes sediments around structures placed in the flow

scroll case - a spiral-shaped water intake device that guides a flow of water into the wicket gates next to the turbines

sedimentation pond (settling basin or stilling basin) - a pond used for settling out suspended materials in water by the materials own weight

sediment deposition - the depositing of reservoir sediments

sediment-flushing gate - a gate installed near the bottom of a dam structure to be used for periodic sediment-flushing operations

sediment flushing - removal of reservoir sedimentation by hydraulic flushing, usually by periodic sediment-flushing operations

sediment scouring - removal of sedimentation by fast-flowing water pick up

sediment sluicing - a slow form of sediment flushing

sediment starvation - effect created downriver from a dam that traps most suspended sediment in its impounded waters and discharges sediment-free water

sediment trapping - effect created upriver from a new dam site where coarser sediments are unable to move through the dam structure and settle in the head pond or reservoir

seismic - characterized by earthquake activity and other vibrations of the earth's crust

service outage - shutdown of a power generating unit, transmission line or other facility for inspection, maintenance and repairs

service panel - a metal box which contains the main breaker and branch circuit breakers, used as a distribution point for electricity

servo motor - an electric device that rotates parts of a machine with precise control of velocity, acceleration, angle and linear position

SESAMEE - trade name of a spreadsheet model used to evaluate hydropower projects and place values on the social and environmental impacts of the project

settling basin or pond (stilling basin) - a pond used for settling suspended load materials out by their own weight, used to minimize suspended sediment inflow into turbines

ship lock - a navigation lock used for boats on a river or reservoir to transit past or through a hydropower dam

short circuit - dangerous and inadvertent contact between the hot and neutral wires in an electric circuit that may trip a circuit breaker

shotcrete lining (sprayed concrete) - a type of concrete that can be applied to non-horizontal areas such as tunnel surfaces by spraying from a pneumatic hose under high pressure

shunt (shunt resistor) - a device used to provide a low-resistance path for an electric current in a circuit

shunt reactor - a device used in high voltage energy transmission systems to help stabilize the voltage during load variations

siphon pit - a hydraulic structure that may be used to seal the downstream end of pressurized water conduit systems and provide a stable back pressure during operations

skimmer wall - a structure that blocks debris from entering turbines by skimming-off unwanted floating materials

sluice - a water channel controlled at its head by a moveable gate called a sluice gate

sluice gate - a movable gate that allows water to flow under it; when a sluice gate is lowered, water may spill over the top in which case the gate operates as a weir

sluicing mode - when shutting down power generation, the turbines can be placed in sluicing mode where the blades can rotate slowly and allow safe fish passage

slurry - a slushy, semi-liquid mixture of water and suspended substances such as cement, clay or coal

small hydro - hydropower projects that are only able to generate 10 MW or less of power

social discount rate - a discount rate used for computing the present value of social project costs and benefits

Social Impact Assessment - details the conditions of people living in areas that will be affected by a new hydropower project and describes impacts the project may have on them

solar cell or photovoltaic cell - a device that converts some of the energy in sunlight directly into electricity by photovoltaic effect

solar farm floating - a technology application in which solar cell systems are situated on structures floating on bodies of water

solar thermal electricity generation - systems that generate electricity by focusing sunlight onto a heat-transfer fluid such as water to produce steam which powers a generator

spatio-temporal - regarding both space and time

spawning - the reproduction process of aquatic animals such as fish when both sexes release eggs and sperm in the same place at the same time

spill - the inefficient release of water from a hydropower reservoir without passing it through the turbines

spillway - a structure used to release surplus water from a river or reservoir by overflow into a downstream area

spiral case - a steel-lined conduit connected to a penstock or intake conduit that evenly distributes water flow to the turbine runner

spot market - the wholesale electricity market into which a power-producer can sell electricity other than under a PPA

square centimeter - a measure of area equal to .155 square inches

square foot - a measure of area equal to .093 square meter or 144 square inches

square inch - a measure of area equal to 6.45 square centimeters

square kilometer - a measure of area equal to 1,000,000 square meters or .386 square mile or 100 hectares

square meter - a measure of area equal to 10.76 square feet

square mile - a measure of area equal to 2.59 square kilometers or 259 hectares or 640 acres

square yard - a measure of area equal to 9 square feet or .836 square meter

S type turbine - a tubular turbine where the water flow route from the inlet to the outlet is shaped like the letter S

stakeholders - persons or entities that would be impacted by a proposed new hydropower project

static - not moving; stationary

static head - the pressure resulting from a non-moving column of water acting under gravity, often measured in meters of elevation drop

static pressure - when water pressure in a horizontal pipe remains the same or static without any loss of pressure in the entire pipe if the water is not flowing

stator - the stationary outer portion of a generator consisting of a frame, magnetic core and armature windings

stator armature - a stator that includes the main current-carrying winding in which electromotive force is produced when magnetic flux rotation is induced

step down - a decrease in voltage of an electric current

step-in rights - rights of a secured lender in a default situation to step-in and take control of a secured project

step up - an increase in voltage of an electric current

stilling basin (settling pond) - a pond used for settling out suspended sediments in water by its own weight, used to prevent or minimize sediments from flowing into turbines

stratification - the variation in temperature and quality of water levels in a body of water as water near the surface is warmed by the sun and rises while colder water sinks to lower levels

stress test - a modelling test to determine how robust a system is and at what point failure is likely to occur

structural guidance systems - fish passage structures such as angled bar racks that create conditions to discourage downstream migrating fish from entering powerhouse intakes

substation - an electrical facility where the voltage of incoming and outgoing electric power current is modified and controlled and voltage can be stepped up or stepped down

supersaturation - the change in water quality that occurs when water passes over a spillway and absorbs air which increases nitrogen content to levels that may harm fish

surcharge capacity - the water volume of a reservoir situated above the spillway crest which cannot be regulated

surge arrester - a protective device for limiting voltage on equipment by discharging or bypassing surge currents

surge shaft (surge tank or surge tower) - a water tank provided at the beginning of a headrace tunnel to dampen harmful effects when turbine valves are closed suddenly and the incoming water under pressure creates a vibrating effect (water hammer) that may damage the pipe and other parts of the system

surge tank (surge tower) - a water tank provided at the beginning of a headrace tunnel to dampen harmful effects when turbine valves are closed suddenly and the incoming water under pressure creates a vibrating effect (water hammer) that may damage the pipe and other parts of the system

suspension insulator - created by linking multiple insulators together to reduce lost power between a suspended high voltage electricity conductor and a transmission tower

sustainable development - development that meets the needs of the present without compromising the ability of future generations to meet their needs from similar natural resources

swidden agriculture - shifting cultivation; slash-and-burn cultivation; rotational farming

switchgear - is composed of electrical disconnect switches, fuses and circuit breakers used to control, protect and isolate electrical equipment

switchyard - a set of facilities next to a power plant in which voltage is transformed and electric current flow is directed onto transmission lines

synchronous - when multiple electric systems are locked to the same frequency as all other systems connected to the same grid

synchronous generator (alternator or AC generator) - a synchronous machine that converts mechanical power into AC electric power through the process of electromagnetic induction

T-line - transmission line

tailrace or tailrace channel - a downstream channel that carries discharged water away from a dam or powerhouse

tailwater - the water released downstream from a powerhouse or dam

take-and-pay clause - in a power purchase contract, a provision that allows a buyer to purchase any amount of off-take electric power that it wishes without requiring a minimum

take-or-pay clause - in a power purchase contract, a provision that commits a buyer to purchase a minimum amount of off-take electric power or pay a financial penalty

tariff - a tax or duty paid to a government; a rate of payment such as from a power purchaser to a power provider under a power purchase agreement

tertiary - third in order or level

terawatt - a measure of electric power equivalent to 1,000 gigawatts, often used to describe generating capacity at national levels

terawatt-hour - a measure of electric energy equivalent to 1,000 gigawatt hours, often used to describe generating ability at national levels

terrestrial - relating to earth and dry land rather than to water or the atmosphere

terrestrial fauna - refers to animals living on land or using land, including aquatic systems, for all or part of their lives

thalweg (talweg) - the line of lowest elevation within a valley or watercourse; lowest points along a line

thermal energy - energy created by the combustion of fossil fuels to create steam that drives turbines

thermal power plant - a power plant where heat energy is converted to electric power by combustion of fossil fuels which creates steam to drive turbines

three-phase power - is a type of three-wire alternating current power circuit with each phase signal 120 electrical degrees apart

topography - study of the form and features of land surfaces

transbasin diversion - man-made conveyance systems that divert water from one river basin to another basin

transboundary or transborder - extending across a border between two countries

transboundary commons - a concept defining how common resources such as water are governed and managed across national borders

transducer - an electronic device that converts energy from one form to another

transformer - an electromagnetic device used to change electricity flow to higher or lower voltages

transients - hydraulic transients or pressure surges are created when sudden changes in flow rates occur in pipelines which may damage or cause catastrophic failure of pipes

transmission - the transfer of electric power from a generation facility to end users

transpiration - the passage of watery vapor out from a living body such as from animals and plants

trash boom - a rope-like device floating in reservoir water used to block trash and other unwanted materials from entering turbine intakes

trash fish - undesired fish caught along with desired fish

trashrack - a rack or screen of parallel bars used near hydropower intake structures to prevent debris from entering turbine intakes

trash screen - a screen placed in water used to block trash and other unwanted materials from entering turbine intakes

tributary - a river or stream that flows into a larger river or stream

trifurcation - division of water flow into three branches such as when a single penstock flow drives three water turbines

tunnel boring machine (TBM or mole) - a machine used to bore underground tunnels by automated boring, used as an alternative to excavation by drilling and blasting

turbidity - the extent to which water has become clouded or unclear due to an increase in suspended sediments

turbinated water - water that has been discharged from a spinning hydropower turbine

turbine - a rotary engine that converts some of the kinetic energy contained in a descending flow of water into mechanical energy

1. Pelton turbines - used for high head applications and large output; an impulse type water turbine

2. Francis turbines - used for medium net head range and large output up to 800 MW per unit

3. Kaplan turbines - used for low head operation with small unit output such as run-of-river projects

4. bulb turbines - used for very low head and low unit output

5. reaction turbine - a wheel that operates like a rotating lawn sprinkler where water under pressure enters at a central point and escapes from the ends of the blades causing rotation of a shaft

6. impulse turbine - a wheel where flowing water strikes buckets or blades to cause rotation

7. pump turbine - used for pumped storage hydropower plants; able to reverse the water flow and operate as a pump to fill an upper reservoir in off-peak periods and revert to a classical water turbine for power generation during peak demand

8. tidal turbine - deployed on the seabed in water depths down to 100 meters and kept in position by gravity, pins or pilings; they can operate with flows from both directions

9. cross-flow turbine - is drum-shaped and directs water flow against curved vanes on a cylinder runner; water flows from outside of the blades to the inside and then from the inside back out

10. propeller turbine - has a runner with three to six blades with the pitch of the blades either fixed or adjustable; major components are a runner, scroll case, wicket gates and draft tube

11. free-flow turbines - utilize flowing water's natural pathway and do not require man-made channels; they can operate in rivers, channels, tidal waters or ocean currents

12. pit turbine - is a variation of the bulb turbine and is used in the head range of 1.5 to 10 meters and unit capacity below 15 MW with efficiency better than S-type tubular turbine units

13. S-type turbine - a tubular turbine where water flow from the inlet to the outlet looks like the letter S; suitable for run-of-river generating stations where the river flow varies considerably

14. aerating turbine - installed to increase dissolved oxygen in water released from varying levels of the reservoir rather than just the bottom which is the coldest and has the lowest dissolved oxygen

turnkey basis - a construction contract where a contractor plans, designs and builds a project making it functional and ready to use by a buyer at an agreed price

Tyrolean weir - a water intake structure which diverts water and some of the sediment carried by the river to a collection channel through a screen

undershot gates - submerged gates in a hydropower dam structure that allow lower-level water releases from an impoundment

unit control board - hydropower plants are operated either locally with a unit control board or remotely through a central control room and/or dispatching center

usufruct - a legal right which grants a temporary right to use or derive income or benefit from the property of another person or entity

utilization factor - the ratio of actual energy output compared to total available energy within the capacity and characteristics of a hydropower plant

Upper Mekong Basin - the portion of the Mekong (Lancang) River drainage basin within China

valve - a closure device for controlling the flow of water

vane - guide vanes are turbine blades that can be adjusted to increase or reduce the flow rate of water through the turbine

vertebrates - animals that have a well-developed internal skeleton of cartilage and bone and a highly developed brain

voltage - a measure of the pressure that pushes electric current through a conductor, measured in volts; one volt is the force required to send one ampere of electric current through a resistance of one ohm

volt-ampere - a measurement of power in a direct current (DC) electrical circuit

volts alternating current - a measure of the strength of an alternating electric field

vortex - a mass of air or water like a whirlpool that spins around fast and pulls objects into its center

Wat - a Buddhist monastery or temple

water clarity effect - an increase in water clarity of a river due to sediment trapping in dam impoundments which results in low-sediment discharges and clearer river flow downriver

water cycle or hydrologic cycle - water constantly moves through a vast global cycle, evaporating from lakes and oceans, forming clouds, precipitating as rain, then flowing back to the sea

water hammer effect (hydraulic shock) - can occur in a pipe when flowing water under pressure is forced to stop suddenly, creating harmful pressure waves that vibrate in the pipe

water pressure - the force exerted by water on the walls of its container or anything in its path; typically measured in pounds per square inch (psi)

water-retaining structures - dams, barrages, dikes, berms, etc.

water temperature effect - a change in water temperature in dam impoundments where water temperature is stratified with discharged water having abnormal temperatures

watershed - the land area that channels runoff from rainfall or other precipitation into a certain stream or river in a common drainage system

waterwheel - a vertical wheel on a horizontal shaft that revolves by the action or weight of flowing water onto the rim

Water Quality Index - shows the pressure exerted by human activities on the water quality of the Mekong River

watt - a measure of electric power; one watt is equal to one ampere of current per second

weir - a type of overflow dam structure used in a river channel to create a reservoir or head pond for intake and water transfer

wet season months - the six calendar months from June to November in the Lower Mekong Basin

wheeling - the transmission of energy for a fee from a generator to an end-user located in another area through the use of an existing distribution or transmission network

wicket gates - adjustable gates that control the flow of water from a scroll case into a turbine passage

World Bank guarantees - cover government-related risks such as contractual risk, regulatory risk, currency risk and political risk

Xe - Lao language term for "river" used mostly in southern Laos instead of "Nam"

yard - 1 yard = 3 feet or .9144 meter