DEFINED OPERATING TERMS AND ABBREVIATIONS

The basis of this document is standardised by the electricity generating companies listed, and will be followed by these parties and amended only after agreement between them. – Enquiries to the Generation Procedures Group, C/o Harvey O'Sullivan Consulting Ltd, PO Box 11595, Manners St, Wellington.

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PREPARATION OF GENERATION PROCEDURES

Generation procedures are prepared by a consensus process involving representatives nominated by major generating companies in NZ, and prominent training providers. These procedures may be derived from existing industry procedures, from established international procedures and practices or may be developed by the Generation Procedures Group itself.

The following companies are represented on the Generation Procedures Group which developed this procedure:

- Genesis Energy Ltd
- Meridian Energy Ltd
- Mercury
- Nova Energy Ltd
- TrustPower
- Contact Energy
- The Energy Trainers
- Transpower (Omaka)

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Disclaimer
This document has been prepared by a group of representatives of the electricity industry for the purpose of providing principles on safety and other practices for use by the generation sectors of that industry. It sets out standards considered to be appropriate for the electricity industry; in some instances further procedures will need to be developed in order to implement those standards. Although this document is recommended by industry representatives, it is not legally binding; as such, the industry representatives involved in its development can accept no liability or responsibility for any injury, loss, damage, or any other claims caused by or resulting from any inaccuracy in or incompleteness of the document.

Changes in This Document

Changes in this document (Issue 3 Rev 3) are summarised below. Where necessary, the full text of a section or clause must be read to understand its meaning.

General changes;

- *Contact Energy added*
- *Mercury name change from Mighty River Power*

New definitions include;

- *Definition for Disconnecting Circuit Breaker*
- *Definition for Compact Switchgear Arrangement*
- *Definition for Gas Insulated Switchgear*

New abbreviations include;

- DCB
- CSA
- IASM
- RASM

CONTENTS

1 PURPOSE

1.1 To define and standardise the meanings of specific terms and abbreviations used in the operation of the power system.

2 POLICY

2.1 Definitions/terms and abbreviations that are liable to be misinterpreted or misunderstood shall be defined.

2.2 Definitions/terms and abbreviations must be compatible with those used in the Safety Manual - Electricity Industry and the Electricity (Safety) Regulations 2010. Where practicable defined terms from these sources are referred to, and not re-defined or re-stated.

2.3 Terms used in other GPG documents must be compatible with the terms as defined in this document.

2.4 Definitions/terms and abbreviations should be consistent with those used in the Transpower document TP.OG 45.03 – *Defined operating and maintenance terms and abbreviations*.

2.5 Where the meaning of a term is unclear, the definition for the term in legislation has precedence, followed in precedence by SM-EI.

3 PRINCIPLES

3.1 Different definitions must not have virtually the same meaning.

3.2 Definitions must be concise and complete.

3.3 Definitions used in I.E.C. or international standards are used, where practical. In some instances long standing NZ usage dictates that an alternative be used.

3 DEFINITIONS

NOTES: (1) Definitions used in Safety Manual - Electricity Industry (SM-EI) apply in this document, and are not repeated in this document.

(2) Terms defined in IEC 60050 and referred to in this document apply in this document. The terms are electronically accessible on the International Electrotechnical Vocabulary (IEV) at www.electropedia.org/. Specific terms have their web reference in this document.

A

Access Permit: As defined in SM-EI.

Active energy: www.electropedia.org/iev/iev.nsf/display?openform&ievref=601-01-19

Anemometer: An instrument for measuring the force or velocity of wind; (A wind gauge)

Associated permit: A Permit that has one or more issuer applied safety measures in common with another permit. Permits are not associated where the common safety measures are controlled by a multilocking system.

Assurance: As defined in SM-EI.

Automatic under frequency load disconnecting: Disconnecting demand by devices detecting –grid system frequency below a pre-set value and initiating automatic disconnection of network feeders.

Auto-reclose (AR): The automatic re-closure of a circuit breaker after a predetermined time following a fault tripping.

Auto-Synchronisation: The process of synchronisation of an unloaded and unexcited synchronous machine that is excited either at the same time as it is coupled to the system or shortly afterwards.

Automatic Voltage Regulator (AVR): A device that continuously monitors the voltage and automatically initiates corrective action to maintain that voltage within pre-set limits.

Auxiliary generator: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-28

Availability: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-05-04

Available for Service (GADS)**:** The operational state of equipment that can be put into service immediately.

B

Balancing (Wind Turbine): With wind turbine blades, adjusting their weight and weight distribution through 2 axes so that all blades are the same.

Base load Set: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-04-20

Black start: The ability to start generating sets at a point of connection and raise them to speed, ready to liven the grid system at that point of connection without any power being obtained from the grid system.

Blades (Wind Turbine): These are the prime mover of the turbine and can be manufactured out of fibre glass and wood.

Blind spot: The conductors between a CB and the associated CT, which may not be effectively protected unless dedicated Blind Spot Protection is installed.

Boiler: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-34

Bus (busbar): A low impedance conductor to which several other conductors can be separately connected.

Bus Section Disconnector: A disconnector in series between two bus sections.

Bus zone (BZ): A zone of protection created when a busbar is divided for fault clearance purposes. A bus zone is bounded by circuit breakers.
Bus zone protection: A scheme of one or more sets of differential relays connected to the CTs at the boundary of a bus (either one three phase or three single phase relays per zone). The protection detects faults within that zone and trips all circuit breakers connected with that bus zone.

C
Capability diagram: A diagram showing the operating limits of a generator or synchronous condenser.
Capacitor bank/stack (C): An assembly of series connected groups of capacitors installed on the power system for voltage support, power factor correction, or harmonic filtering.
Capacity Factor: The ratio of the average power produced by a turbine to its rated power.
Circuit breaker (CB): A switching device designed to interrupt load and fault current in a circuit.
Circuit breaker lockout: The status of a CB deliberately prevented from operating due to the action of a monitoring or protection device.
Circuit breaker fail protection: Backup protection that monitors the performance of a circuit breaker following a main protection relay operation. Circuit breaker fail protection trips all other circuit breakers connected to the same bus (or bus section) if a circuit breaker fails to open after a trip command from the main protection.
Circuit breaker in distress: A defective circuit breaker that has deteriorated to a condition where it is a hazard to personnel and/or other equipment.
Close (verb) (CL):
- Electrical: to operate a switch, CB, disconnector etc. to permit the flow of electric current;
- Mechanical: to operate a device so as to prevent the passage of a substance.

Cold Start up of a thermal generating set:
www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-03-01
Combined Cycle Gas Turbine (CCGT): Comprising one or more Gas Turbine sets and one or more Steam Turbines where, in normal operation, the waste heat from the Gas Turbines is passed to the water/steam system of the associated Steam Turbine or Steam Turbines.
Combined heat and power:
www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-01-24
Commissioned: The operational state of equipment which has undergone the commissioning process and is brought back under the operational control of a control centre.
Commissioning: The process of bringing new or reinstalled equipment into normal power system operation.
Compact Switchgear Arrangement (CSA): Modular switchgear assembly consisting of one or more devices such as a circuit breaker, disconnector and earth switch. May also include CT's and VT's.
Compensate: Operation of a synchronous condenser or a generating set as a synchronous condenser.
Condenser: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-56
Confined Space (Entry) Permit: A permit used in conjunction with other work control systems, i.e., AP, TP, or WA, required for entry into a confined space. It should;
- Note any precautions or instruction necessary for safe entry and execution of the work;
- Be provided to the person directly responsible for the work;
- Record which persons enter the space;
- Be explained to and complied with by persons involved in the work;

- Record when all persons have left the confined space;
- Be displayed in a prominent place.

Consumer: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-01-03
Cooling tower: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-57
Current Transformer (CT): An instrument transformer for obtaining measurements of currents at high voltages suitable for metering and protection purposes.
Cut in Speed (Wind Turbine): The minimum wind speed required to turn the blades of a wind turbine.
Cut out Speed (Wind Turbine): The wind speed at which a braking system on a wind turbine will automatically feather or stop the blades from turning to prevent damage

D

Dam: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-05
Dead band: A characteristic of an automatic control system, e.g. governor or voltage regulator, within which a change of value of an input signal may take place without causing a perceptible change in output signal. Sometimes referred to as dead zone.
Decommissioned: Equipment permanently disconnected from the power system.
De-energised (Electrical): As defined in SM-EI.
Demand: The level of power flow, either averaged over a period (usually half-hour) or at a given time (spot demand). A measure of the rate of consumption of electrical energy.
Disable: Prevent the functioning of equipment/system, e.g. protection and/or control system.
Discharged (electrical): Short circuited and/or connected to earth in such a manner as to ensure an effective dissipation of stored electrical energy.
Disconnecting Circuit Breaker (DCB): Provides the functionality of a circuit breaker and a disconnector combined in a single unit without the need for separate disconnectors
Disconnector (Dis, dis or DS): A switch that, when in the open position provides isolation in accordance with specified requirements. An example is:
Bus section disconnector: A disconnector in series between two bus sections.
Dispatch: The process of:

- Pre-dispatch scheduling to match expected supply with expected demand, and to allocate ancillary service offers and transmission offers to match expected grid system conditions;
- Rescheduling to meet forecast demand; and
- Issuing instructions based on the schedule and the real time conditions to manage resources to meet actual demand.

Disturbance recorder: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-43
Draught tube: The duct through which water flows from a hydro turbine to the tailrace.

E

Earthing (verb)**:** The process of making an effective conducting connection to the general mass of earth.
Earth fault: A defect in an electrical circuit or apparatus that results in a current flow to earth at the point of the defect.
Earth grid: A bonded assembly of conductors buried beneath a switchyard to provide a low impedance connection with the general mass of earth.
Earth stick: A hand-held approved handle usually made of fibreglass for attaching portable earths to earthing horns.
Earth switch (ES): A switch that when closed provides an electrical connection between electrical equipment and the general earth mass.

Earth truck: A withdraw-able carriage which replaces the circuit breaker carriage and is specifically used for earthing.
Earthing horn: A fitting attached to high voltage equipment used for the connection of portable earth headclamps.
Earths: A generic term for the apparatus used for earthing. This includes work party earths (those earths applied additional to issuer applied earths).

Notes:

- For three phase A.C., a "set of earths" consists of portable earths which, when applied, effectively connect the three phases together as well as to earth/neutral.
- "Portable earths" does not include earthing trucks or other earthing devices for special situations.

Enable: Restore the functioning, e.g. of a protection and/or control system, after that system has been disabled.
Energised: As defined in SM-EI.
Energy reserve of a Reservoir (lake):
www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-01-16
Event: An occurrence that results in Harm or Serious harm to employees and/or contractors, and /or property damage, and or production loss, and/or non-compliance with legislation.

F
Failure to operate: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-07
Fault: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-01
Related terms:

Busbar fault: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-18
Fault clearance: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-28
Fault current: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-02-25
Permanent fault: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-10
Transient fault: www.electropedia.org/iev/iev.nsf/display?openform&ievref=191-05-17
Transient fault (TP.OG 45.03): A fault that is self rectified immediately after the faulted equipment is tripped or disconnected.

Feathering (Wind Turbine): To change the blade pitch angle of all or part of a blade to reduce aerodynamic lift.
Feeder: A circuit that provides a direct connection to a customer.
Field circuit breaker (FCB): A circuit breaker in the main field excitation supply of an alternator or synchronous condenser.
Flag: A visual indicator, usually associated with a relay or other automatic device, which signals a specific process has occurred.
Francis turbine: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-14
Frequency control: Adjustment of power generation to maintain system frequency close to the target frequency.
Frequency deviation: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-01-06

G

Gas flooding area: Any area, space or enclosure subject to deliberate flooding by a non – flammable gas e.g. machine enclosures, switchrooms, etc.
Gas Insulated Switchgear (GIS): A form of a Compact Switchgear Arrangement, typically filled with SF6 gas.
Gas turbine set: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-23
Gate: A device for controlling the flow of water in a canal, conduit, penstock etc.
Generating set (G): A machine transforming energy into electricity.
Generation Schedule: The scheduling of generation facilities for a specific period.
Generator stability: The characteristic that determines a generator's normal operating envelope and its ability to regain it after a disturbance.
Geothermal power station:
www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-01-28
Grid/Grid system: That part of electricity transmission system, the operation of which is undertaken by the grid operator./ (TP.OG 45.03)**:** That part of the electric power system which electrically interconnects any or all points of service.
Grid emergency notice: A notice issued by the system operator.
Grid security notice: A notice issued by the system operator.
Gross head: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-01-11
Guy: A cable or wire used as tension support between the ground and tower.

H

Headclamp: The clamp that connects the portable earth to the earthing horn or conductor.
Headgate /intake gate (H/G): The gate controlling the entry of water to the pipeline or penstock supplying the turbines.
Heat Recovery Steam Generator (HRSG): Is a boiler that uses the hot exhaust from a gas turbine to generate steam.
High Voltage (HV): As defined in SM-EI.
Horizontal Axis Wind Turbine (Wind Turbine): The most commonly seen turbine. The generator and brakes are housed in a nacelle at the top of a tower. There are usually two or three blades, resembling propellers, which can be designed to turn either up-wind (facing into the wind) or down-wind (facing out of the wind).
Hot start-up of a thermal generating set:
www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-03-02
Hot work permit: (For related terms, see "hot work", "gas hazard area", "restricted area" in SM-EI.) A permit used in conjunction with other work control systems, i.e., AP, TP, or WA for hot work e.g. in a gas hazard area or restricted area containing a flammable substance.
Hub (Wind Turbine): Solid cast component mounted directly to rotor shaft that has blades mounted to it.
Hub Height (Wind Turbine): The height above the ground that a horizontal axis wind turbine's hub is located.
Human machine interface: (see definition of man machine interface)
Hydro Power Station: A power station in which electricity is generated by conversion of water (hydro) energy.

I

Idling (Wind Turbine): A condition of a turbine rotating slowly and not producing power.
Impulse type turbine: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-11
Incident: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-03

Induction (electrical): The phenomenon causing voltage to be present in a conductor (line, bus, etc.) due to the influence of an adjacent energised conductor. Induction can produce very high voltages. This includes both electro-magnetic and electro-static effects.
Issuer: As defined in SM-EI.
Issuer Applied Safety Measure: As defined in SM-EI
Instantaneous reserve: Interruptible load, partly loaded spinning reserve or tail water depressed reserve.
In service: Means that for equipment it is not isolated: and for a control system it is in a state to perform its designated function, and its associated equipment is not isolated.
Interruptible load: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-04-41
Intertrip (ITRIP): A signalling system whereby a signal initiated at one station trips a CB at another station.
Islanded operation: The condition when a section of the power system is disconnected from and operating independently of the remainder of the power system.

J
Jug handle: A loop attached to the station earth used for connecting portable earth tail clamps.
Joint control: The simultaneous control and automatic load sharing of two or more generating units.

K
Kaplan turbine: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-15

L
Ladder Climbing Assistance (Wind Turbine): A device that assists a person while climbing a wind turbine ladder.
Latched Mechanically: Held in a pre-set position by means of a pawl or similar device, in readiness for tripping, e.g. a closed circuit breaker.
Lead-Lag (Wind Turbine): Blade motion in the plane of rotation.
Leading Edge (Wind Turbine): The area of a turbine blade surface that first comes into contact with the wind.
Leeward (Wind Turbine): Away from the direction from which the wind blows.
Live: As defined in SM-EI.
Live work: As defined in SM-EI.
Livening: The process of connecting equipment, e.g. primary equipment and associated SCADA, communications equipment or protection to the power system.
Load shedding: The process of deliberately disconnecting pre-selected loads from a power system in response to an abnormal condition in order to maintain the integrity of the remainder of the system.
Load Stability: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-03-09
Local control: Control of an operation at a point on, or adjacent to, the controlled device.
Local service (LS): Local AC supply providing power for station auxiliary services.
Lock out (L/O) (Final Tripping Lock-Out):
www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-02-39
Lock-out box: A lockable facility for holding keys, fuses etc.
Low Voltage (LV): As defined in SM-EI.
Lower Explosive Limit (LEL): The minimum percentage of combustible gas in a mixture with air that can be ignited and will support flame.

M

Maintenance isolation point (MIP): The point where the equipment is isolated by the recipient for work under a Work Authority. Also referred to as a Recipient Applied Safety Measure.

Main generator: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-27

Man machine interface : www.electropedia.org/iev/iev.nsf/display?openform&ievref=394-33-19

Manual load shedding: The forced disconnection of load by an operator/controller.

Master/local switch (MLS): Switch provided for selecting remote or local control of a circuit breaker or generators.

Maximum voltage limit: That voltage level, above the nominal voltage at the point of service, at which dispatch customers and connected parties are required to take independent corrective action to minimise the risk of damage to equipment.

Mean Power Output (Wind Turbine): The average power output at a given mean wind speed based on a Raleigh frequency distribution.

Mean Wind Speed (Wind Turbine): The arithmetic wind speed over a specified time period and height above the ground.

Metal clad switchgear: HV switchgear in which the circuit breaker, feeder connection, busbar connection and ancillary items are located in separate metal-partitioned compartments.

MIP tag: means a label, notice, lock, or other similar device, applied to a MIP by the recipient to indicate an isolation has been applied. Also referred to as a RASM Tag.

Multilock box: A lock-out box used in a multi-locking system.

Multilocking system: A system of locks associated with locking off safety measures.

N

Nacelle (Wind Turbine): The cover for the gearbox, drive train, generator, and other components of a wind turbine.

Neutral: www.electropedia.org/iev/iev.nsf/display?openform&ievref=601-03-10

Neutral Point (in a polyphase system):
www.electropedia.org/iev/iev.nsf/display?openform&ievref=601-02-22

Node: A designated point within the grid.

O

On load: In service and carrying current.

Open (OP) (verb)**:**

- Electrical: to operate a switch, CB, disconnector etc. to prevent the flow of an electric current;
- Mechanical: to operate a gate or valve to permit the passage of a substance.

Operating Competence: A formal document issued by an employer testifying that the named employee is competent to carry out specified operating duties at the stated location(s).

Operating Order (O/O): A planned sequence of operating actions (or a single action) compiled on a designated form. Also related terms;

> **Operating sequence (OS):** (Same as O/O - Terminology used by Transpower)
> **Supplementary Operating Order:** An extra operating order used when additional actions are required when actioning an existing operating order.

Operating range: The range in lake level between minimum and maximum control levels over which a hydroelectric reservoir or storage lake may be legally operated.

Operational control: The exercising of authority, whether direct or delegated, to control equipment.

Operational states:

- In service: The state of equipment that is connected to a source of energy or may be connected to a source of energy by an operating action.
- Removed from service: Equipment isolated to the extent that it ceases to perform its designated function.

Outage:

- Outage: Item(s) of equipment not available to perform the intended function.
- Forced Outage: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-05-08
- Maintenance Outage (MO) (GADS): An outage which can be deferred beyond the end of the next weekend but requires the unit to be removed from service before the next Planned Outage.
- Outage time: The time during which power system equipment is not available for service. It includes;
  (a) Operating time
  (b) Operational control (OC) transfer process time
  (c) Maintenance switching time, and
  (d) Work time
- Planned Outage (PO) (GADS): Outage (deliberate, for maintenance) which has been scheduled well in advance and has been approved in terms of the planned outage programme.

Outage Plan: An overall program for outage windows of power system equipment. The outage plan is a living document and under continual review.
Overspeed device: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-55
Overload capacity: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-03-10

P

Paralleling: Connecting a power system component (generator, transformer, transmission circuit etc) in electrical parallel with the power system, i.e. synchronising.
Peak demand: The highest demand (system, area, and station) for electrical power during a specified period, usually a day, a quarter or a year.
Piezometer: an instrument for measuring pressure commonly used for monitoring water pressure in a dam.
Pelton turbine: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-13
Penstock: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-09
Permit: A collective term for the access permit and the test permit. Under a permit, the recipient and their work party have temporary access for work activities to specific isolated equipment, which is in a defined state.

- Access Permit: As defined in SM-EI.
- Test Permit: As defined in SM-EI.
- Associated permit:
- **Permit Recipient Competence (PRC/PHC):** The proof of competence, assessed by a person with the appropriate authority, which documents that the employee is competent for the purposes of being a recipient for an access permit or test permit; and has recognition of competence from their employer.

Phase: www.electropedia.org/iev/iev.nsf/display?openform&ievref=601-03-09
Pilot exciter: An exciter that supplies all or part of the power required for the excitation of a main exciter.
Pitch Control (Wind Turbine): A method of controlling a wind turbine's speed by varying the orientation, or pitch, of the blades, and thereby altering its aerodynamics and efficiency.
Plant Outage Request: A formal request for a generating plant outage

Prevailing Wind (Wind Turbine): The wind direction occurring most frequently at a site.
Point of connection: A point where **electricity** may flow into or out of a network.
Point of isolation:

- Electrical: A disconnector, fuse-link, withdrawable CB, etc. that, when open or removed, provides a specific minimum separation distance between live equipment and that which is isolated;
- Mechanical: a device that, when closed, provides a physical barrier between a source of harm and equipment which is isolated.

Point of service: A normally contiguous electrical busbar of a particular voltage within the New Zealand electric power system which is the point where services are delivered by the grid asset owner for specific points of connection.
Pole slip: When an ac generator/motor operates asynchronously because its field excitation is too low or too negative to maintain synchronism
Power station: www.electropedia.org/iev/iev.nsf/display?openform&ievref=601-03-01
Power system: The network for the generation, transmission, distribution and supply of electricity in New Zealand as an integrated power system consisting of generating units, distribution networks and transmission networks.
Power System Stability: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-03-01
Primary equipment: Equipment directly used for generation, transmission and distribution of electrical energy.
Procedure: Specified way to perform an activity.
Protection: The equipment provided for detecting abnormal conditions in a power system and then initiating fault clearance or actuating signals or indications.
Purging: The controlled removal of a fluid or gas by replacing it with another.

Q
Quality of supply: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-01-05

R
Ramp rate: The rate at which the power is increased or decreased on a generator, on the HVDC link, or in the load. Expressed as MW/ minute.
Ramping rate: The rate (in cumecs per hour) by which the flow of a river may be changed as a result of power station or control gate operation.
Reactive power: The rate at which energy flows in the power system between alternators and inductive and capacitive equipment, performing no useful work. The product of voltage and out of phase component of alternating current measured in VARs.
Reactive power control: A control system which monitors and controls reactive power flows to ensure system voltages remain within minimum and maximum limits.
Reaction type turbine: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-12
Reactor: An electromagnetic device providing inductive reactance for current limiting and compensation for excessive capacitive currents.
Ready for service: A declaration made by an operator to the control centre. It indicates that an item of equipment, which is released, can be returned to the operational control of the control centre.
Recall time: The estimated time required during the work to:

- Return the equipment in a condition suitable for service; and
- Be clear of the equipment.

Recipient: As defined in SM-EI.

Recipient Applied Safety Measure: As defined in SM-EI
Reclose block (RCB): A statement made by the RCB issuer to a recipient that equipment which livens specified equipment/transmission circuit under live access will not be operated either automatically or manually.
Related term is:

- **Reclose block approval:** Approval by the controller to the RCB issuer for a reclose block to be issued.

Removed from service: Equipment isolated to the extent that it ceases to perform its designated function.
Ring main unit (RMU): A high voltage power distribution system comprising a combination of switchgear to facilitate voltage distribution in ring circuits and mostly used for industrial, commercial or municipal distribution installations.
Risk of trip (ROT): An operating condition where there is a possibility of equipment tripping, resulting from work being done on or near power system equipment.
Restricted Area: As defined in SM-EI.
Root (Wind Turbine): The area of a blade nearest to the hub. Generally the thickest and widest part of the blade.

S
Safety Observer: As defined in SM-EI.
SCADA: Supervisory control and data acquisition. The monitoring and remote control of equipment from a central location using computers.
Scheduled operation (of a generating set)**:** Operation of a selected generating set at constant power, or on successive steps of power, the value of which are previously specified, within a given period of time.
Secondary equipment: Equipment used in control and monitoring the operation of primary equipment, e.g. protection, instrumentation, and metering.
Sectionalise: Breaking a conductor or network into sections and livening in stages, for the purpose of fault finding or controlled restoration.
Setting Angle (Wind Turbine): The angle between the blade Chord and the plane of the blade's rotation. Also called Pitch or blade angle. A blade carved with a twist has a different setting angle at the tip than at the root.
Shall: Indicates that a statement is mandatory.
Short-circuit current: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-02-26
Should: Indicates a recommendation.
Shutters (switchgear)**:** Lockable barriers to prevent access into the spouts of withdrawable switchgear.
Site Access: The authority granted by the generation asset owner that an employee may enter a specified generation facility.
Site Entry Competence: The proof of competence, assessed by a person with the appropriate authority, which documents that the employee is competent and is assessed as suitable to be granted site access.
Sluice gate: A vertically sliding gate built into a dam or other hydraulic structure as a means of releasing impounded water.
Spark Gap: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-03-49
Speed (system): The frequency of the power system.
Speed droop: A governor characteristic, usually adjustable, which matches the change in load output to changes in machine speed/system frequency.
Speed governor: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-54

Spillway gate: A gate in a dam controlling water flow through a spill channel, to regulate lake level during high water inflows.
Spinning reserve: (TP.OG 45.03)**:** The available capacity of synchronised plant which can provide immediate assistance during a fall in system frequency.

- Partly loaded spinning reserve: spare capacity, held in reserve on a generation unit, generating but not operating at full output, which is able to provide fast instantaneous reserve or sustained instantaneous reserve following a drop in system frequency to a specified level below 50Hz.
- Fast instantaneous reserve: the instantaneous MW provided at 6 seconds after the contingent event to arrest the system frequency fall at or above the minimum specified frequency.
- Sustained instantaneous reserve: The average MW provided between 0 and 60 seconds to return the system frequency to the statutory requirements.

Sprag: To render equipment incapable of operating by mechanically preventing its movement.
Stability limit: The maximum power that can be transferred through any part of a power system without the power system losing stability under specified conditions.
Stalling (Wind Turbine): Output regulation is achieved by altering the blade pitch.
Start-Up (Wind Turbine): The wind speed at which a wind turbine rotor starts to rotate. It does not necessarily produce any power until it reaches cut-in speed.
Stator: The stationary windings in a generator.
Steam turbine: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-47
Superheated steam: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-44
Superheater: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-45
Supervisor: As defined in SM-EI.
Surge: A sudden fluctuation in voltage and/or frequency typically occurring during a system fault.
Surge diverter: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-03-51
Surge tank: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-10
Switchgear: A collective term for switches of all types and their associated equipment, including circuit breakers.
Synchronous speed: The speed of rotation of an ac machine, which results from the frequency of the system to which the machine is connected and the number of poles in the machine.
Synchronous time: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-04-12
Synchroscope: An instrument used to indicate synchronism of two ac systems, and used to synchronise incoming equipment to the power system.
System number: A coded number assigned to specific equipment for the purposes of the operation of the grid system and the management of the grid assets that, when used in conjunction with a locality name, uniquely identifies the equipment.
System security: The ability of the power system to withstand faults, or sudden loss of generation, and maintain continuous supply, or limit the loss of supply.

T
Tail clamp: The clamp that connects the portable earth to the station earth.
Tailrace: A channel through which the water from a hydro power station flows.
Tail water (TW): Water exiting from the hydro power station turbine into the tailrace.
Target frequency: The nominal system frequency of 50Hz.
Test Permit: As defined in SM-EI.

Thermal power station: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-01-22
Thermal power unit: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-19
Time error (deviation of synchronous time) (TE): Deviation of synchronous time from standard time.
Tip (Wind Turbine): The end of a blade farthest from the hub.
Tip Speed Ratio (Wind Turbine): The difference between the rotational speed of the tip of the blade and the actual velocity of the wind.
Tower (Wind Turbine): Tubular or lattice device used to promote the rotating parts of a wind turbine from the ground
Trailing Edge (Wind Turbine): The part of a wind energy conversion device blade or airfoil that is the last to contact the wind.
Total recall time: Contractor recall time plus any time required for operating to return the equipment to service.
Transient fault: A fault that is self-rectified immediately after the faulted equipment is tripped or disconnected.
Transmission circuit: An electrical circuit the primary purpose of which is the conveyance of electricity from one geographical location to another.
Transmission line: A series of structures carrying overhead one or more transmission circuits.
Transmission losses: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-06-06
Truck: A term used for the with-drawable circuit breaker carriage.
Turbine: A device that creates rotational energy from the kinetic energy of a fluid (water, steam or hot gases) striking blades attached to a shaft.
Turbo-generator set: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-21

U
Unit: The combination of turbine and generator as a device for producing electrical energy also includes the related boiler and unit auxiliaries at a thermal power station.
Under frequency limit: The frequency below the normal frequency range, at which independent remedial action is initiated to minimise the risk of a grid system collapse.
Unit auxiliaries: www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-29
Unit generator transformer:
www.electropedia.org/iev/iev.nsf/display?openform&ievref=602-02-31
Untag (verb): When used as a verb means to remove a Do Not Operate Notice.
Upper Explosive Limit(UEL): The maximum percentage of combustible gas in a mixture with air that can be ignited and will support flame.

V
Variable Pitch (Wind Turbine): A type of wind turbine rotor where the attack angle of the blades can be adjusted either automatically or manually.
Vertical Axis Wind Turbine (Wind Turbine): A turbine on which the blades revolve around a vertical (up and down) axis.

Voltage:

Nominal voltage of a system:
www.electropedia.org/iev/iev.nsf/display?openform&ievref=601-01-21
Operating voltage:
www.electropedia.org/iev/iev.nsf/display?openform&ievref=601-01-22

Voltage collapse: www.electropedia.org/iev/iev.nsf/display?openform&ievref=604-01-22
Voltage control: www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-04-23
Voltage detection device (VDD): An approved device used to prove equipment is de-energised prior to applying portable earths.
Voltage support: An ancillary service comprising reactive power injection to the power system to boost voltage at the point of injection**.**
Voltage transformer (VT): An instrument transformer for obtaining measurements of a high voltage, by reducing proportionally to a low voltage suitable for metering and protection purposes.

W

Window: A date/time slot in a programme for planned access to power system equipment.
Wind Farm (Wind Turbine): A piece of land on which wind turbines are sited for the purpose of electricity generation.
Wind Rose (Wind Turbine): A diagram that indicates the average percentage of time that the wind blows from different directions, on a monthly or annual basis.
Wind Speed (Wind Turbine): The rate of flow of the wind undisturbed by obstacles.
Wind Speed Duration Curve (Wind Turbine): A graph that indicates the distribution of wind speeds as a function of the cumulative number of hours that the wind speed exceeds a given wind speed in a year.
Wind Speed Frequency Curve (Wind Turbine): A curve that indicates the number of hours per year that specific wind speeds occur.
Wind Speed Profile (Wind Turbine): A profile of how the wind speed changes with height above the surface of the ground or water.
Wind Turbine: A term used for a wind energy conversion device that produces electricity.
Wind Turbine Rated Capacity (Wind Turbine): The amount of power a wind turbine can produce at its rated wind speed, e.g., 100 kW at 20 mph. The rated wind speed generally corresponds to the point at which the conversion efficiency is near its maximum. Because of the variability of the wind, the amount of energy a wind turbine actually produces is a function of the capacity factor (e.g., a wind turbine produces 20% to 35% of its rated capacity over a year).
Wind Vane: An instrument for measuring wind direction
Wind Velocity: The wind speed and direction in an undisturbed flow.
Work authority (WA): A system used to manage work on or near equipment which is in-service at the time access to that equipment is granted.
Work authority competence: The proof of competence, assessed by a person with the appropriate authority, which documents that the employee is competent for the purposes of receiving and returning a work authority; and has recognition of competence from their employer.
Work party earths (for related terms, see "earths")**:** Those earths applied additional to issuer applied earths.
Work time: The time required by the work party to complete the planned activities.

X

Y

Yaw (Wind Turbine): The rotation of a horizontal axis wind turbine around its tower or vertical axis.

Z

4 ABBREVIATIONS

A

A	Ampere
ac	Alternating Current
AFS	Available for service
AOC	Area Operating Centre
AP	Access Permit
AR	Auto Reclose
ASM	Apply safety measures
ASS	Assurance
AUFLD	Automatic Under Frequency Load Disconnecting
AUFLS	Automatic Under Frequency Load Shedding
Auto	Automatic
Aux	Auxiliary
Aux Sw	Auxiliary switch
AVR	Automatic Voltage Regulator

B

BTWN	Between
BZ	Bus Zone

C

C	Capacitor bank/stack
CB	Circuit Breaker
CBF	Circuit Breaker Fail
CC	Control Centre
CCGT	Combined Cycle Gas Turbine
Cct (or cct)	Circuit
CIR	Communications interruption request
CL	Close
C/O	Change over
CPCS	Central Power Conditioning System
CR	Control Room
CRR	Cylinder release relay
CSA	Compact Switchgear Arrangement
CSR	Continuous Signal Receive
CT	Current Transformer
CVT	Capacitor Voltage Transformer
C/W	Cooling water

D

dc	Direct Current
DCB	Disconnecting Circuit Breaker
DCS	Distributed Control System
DGA	Dissolved Gas Analysis
Dis, dis, DS	Disconnector
DNO	Do Not Operate (Notice)
D/T	Draft/draught tube

DS, Dis, dis	Disconnector
D/W	De-water

E

EDR	Equipment Defect Report
E/F	Earth fault
EHV	Extra High Voltage
EMI	Electromagnetic interference
EMS	Energy Management System
EPC	Electric Power Company
ES	Earth Switch
ESA	Electrical Supply Authority
ESV	Emergency Stop Valve

F

F/C	Fuse Circuit Breaker
FCB	Field Circuit Breaker
FDR	Feeder
FRED	Fast Response Emergency Dumper
FTE	Frequency time error

G

G	Generating set/unit
GADS	Generation Availability Data System

Related Abbreviations for GADS:

GN	Generating
D1	Unplanned derating (immediate)
D2	Unplanned derating (Delayed within 6 hrs)
D3	Unplanned derating (Delayed within 7 days)
D4	Maintenance derating
DE	Derating Extension
MO	Maintenace outage
NC	Non-curtailing Equipment outage
PD	Planned derating
PO	Planned outage
RS	Reserve shutdown
SC	Synchronous condenser (compensate)
SE	Scheduled extension
SF	Start failure
U1	Unplanned outage (forced outage)
U2	Unplanned outage (Delayed within 6 hrs)
U3	Unplanned outage (Delayed within 7 days)

GIS	Gas Insulated Switchgear
GOSP	Grid Operating Security Policy
GPG	Generation Procedures Group

H

HAWT	Horizontal axis wind turbine
H/G	Headgate
HCT	Helper Cooling Tower

HMI	Human machine interface
HP	High Pressure
HRSG	Heat Recovery Steam Generator
HV	High Voltage
HVDC	High Voltage Direct Current
HWL	Headwater level
Hyd	Hydraulic
Hz	Frequency

I

I & E	Isolated and Earthed
ICADA	Integrated Control and Data Acquisition
IASM	Issuer Applied Safety Measure
ITC	Interruption to connection
ITRIP	Intertrip

J

K

kt	Kilotonne
kV	Kilovolts
KVA	Kilovoltampere
kvar	Kilovoltampere reactive
kW	Kilowatts
kWh	Kilowatt-hour

L

LED	Light Emitting Diode
LEL	Lower Explosive Limit
LLW	Live line work
LMU	Line Matching Unit
LOC	Location (Also used for “Loss of Connection”)
LOS	Loss of supply
L/O	Lock out
LS	Local Service
LV	Low voltage
LW	Live work

M

MAD	Minimum Approach Distance
MAR	Minimum Approach Request
MCR	Maximum Continuous Rating
MDF	Main Distribution Frame
MIP	Maintenance Isolation Point
MLS	Master/Local - Selector Switch
MMI	Man Machine Interface
MMS	Maintenance management system
MSD	Maintenance/Service/Disable Switch
MVA	Megavoltampere
Mvar	Megavoltampere reactive

MW	Megawatt

N

NZDT	NZ Daylight Time
NZST	NZ Standard Time

O

OCB	Oil Circuit Breaker
OC	Operational Control
O/C	Overcurrent
ODJB	Outdoor Junction Box
ODS	Outdoor Station
OEC	Ormat Energy Converter
OLTC	On Load Tap Changer
O/O	Operating Order – Transpower use OS (Operating Sequence)
OP	Open
OR	Operational request
O/S	Out of service
OS	Operating Sequence

P

R∅,Y∅,B∅	Phasing: Red, Yellow, Blue (Note – For all new installations phasing now Red, White, Blue)
R∅,W∅,B∅	Phasing – Red, White, Blue
PAS	Pre Arranged Switching
pf	Power factor
PHC	Permit Holder's Certificate/Competence *(but see **PRC** – preferred term)*
PLC	Power Line Carrier, or Programmable Logic Controller
PMG	Permanent Magnet Generator
Pnl	Panel
PoC	Point of control
POR	Plant Outage Request
P/P	Pump
PRC	Permit Recipient Competence
Prot	Protection
PTP	Permission to proceed

Q

R

RASM	Recipient Applied Safety Measure
RCB	Reclose Block
RFS	Release/Remove from service
RMU	Ring main unit
ROT	Risk of Trip
RPC	Reactive Power Control
rpm	revolutions per minute
RSA	Rotor sweep area
RS	Removal from service (Request) also used for "Reserve Shutdown"
RTS	Return to Service

RTU	Remote Terminal Unit

S

SA	Surge arrester
SC	Synchronous condenser
SCADA	Supervisory Control and Data Acquisition
SEL	Select
SER	Sequential Event Recorder
SFIR	System Fault and Interruption Report
SLD	Single Line Diagram
SPI	Standard Practice Instruction
SM-EI	Safety Manual - Electricity Industry
SVC	Static VAR Compensator

T

T	Transformer
TE	Time error
TP	Test Permit
TSw	Test switch
TWD	Tail Water Depression
TWL	Tail Water Level

U

U	Unit
UAIC	Unit automation interface cubicle
UEL	Upper Explosive Limit
UHF	Ultra High Frequency

V

V	Volt
VAWT	Vertical Axis Wind Turbine
VAR	Voltampere reactive
VDD	Voltage Detecting Device
VDU	Visual display unit
VG	Valve Group -
VHF	Very High Frequency
VT	Voltage Transformer
V/V	Valve

W

W	Watt
WA	Work Authority
WAC	Work Authority Competence
WTG	Wind Turbine Generator
WV	Wind velocity

X

Y

Z

APPENDIX A - REFERENCES

SM-EI: Safety Manual - Electricity Industry

IEC 50: IEC Publication 50 International Electrotechnical Vocabulary

Electropedia (also known as the **"IEV Online")** IEC 60050 (www.electropedia.org/)

GADS: Generation Availability Data System

TP.OG 45.03 Defined operating and maintenance terms and abbreviations