

## TRANSPower NIGUP: GLOSSARY AND ACRONYMS

<b>7/2.64 SC/GZ</b>	This is a type of earthwire, namely Steel Core with a galvanised coating, with 7 strands of steel, all of which are 2.64 mm in diameter.
<b>A</b>	A unit of measure for electrical current i.e. Amperes or Amps.
<b>AAAC</b>	All aluminium alloy conductor.
<b>ACRE</b>	Acronym for the Area, Corridor, Route, Easement methodology developed and used by Transpower for the Upgrade Project. Transpower's methodology for identifying alternative and final route options.
<b>AC</b>	Alternating Current – A flow of electrical current which reaches maximum in one direction, decreases to zero, then reverses itself and reaches maximum in the opposite direction. The cycle is repeated continuously and the number of cycles per second is equal to the frequency (Hz). The New Zealand electricity system frequency is 50 Hz.
<b>Access and Construction Agreements</b>	An agreement between Transpower and a Landowner across whose property the overhead transmission line will pass. These agreements take account of the requirements/concerns of the Landowner and detail to all parties where and how the access would be formed and used.
<b>ACSR</b>	Aluminium Conductor Steel Reinforced – conventional conductors historically used in New Zealand on high voltage lines. The steel stranded core wires have historically been galvanised coated, but new conductor would have an aluminium coating.
<b>AEE</b>	An assessment of effects on the environment which must accompany each application for a resource consent or notice of requirement for a designation under the Resource Management Act.
<b>Aeolian Vibrations</b>	Steady wind speeds between about 2 to 7 m/sec (7 to 25 km/h) can cause the conductors to vibrate. These are known as Aeolian vibrations, which can cause the conductor and fittings to fatigue and possibly fail over a period of time.
<b>Aerial Laser Survey (ALS)</b>	This is a survey undertaken from equipment mounted in a helicopter or fixed wing plane, that uses laser sending and receiving timing techniques to scan ground and above ground obstacles for relative and global coordinate information.
<b>Air Insulated Substation (AIS)</b>	A high-voltage substation using atmospheric air as the main source of insulation.
<b>Back Flash Failure</b>	When lightning strikes a tower or earthwire, the energy tries to dissipate to earth through the footing of the tower. If the tower footing resistance is high, the energy cannot dissipate quickly enough and, as a consequence, a “build-up” of voltage takes place in the body of the tower. This build-up of voltage can be high enough to breach the dry-arc length of the insulator resulting in a flash from the tower to the conductor. This is called a “Back-Flash”.

<b>Beam Set Transporter</b>	A multi-wheeled transporter truck with two long beams to carry a heavy load, possibly with an independent rear steering for longer units.
<b>Bored Concrete Pile Foundations</b>	A foundation formed by boring a circular hole in the ground, inserting a reinforcing steel cage, and pouring in wet concrete. It may or may not have a steel casing to assist with its construction.
<b>Busbar/BUS</b>	A low impedance conductor to which several circuits/conductors can be separately connected.
<b>Cable Circuits</b>	Electrical circuits using underground power cables.
<b>Cable Transition Station</b>	A small station to connect an overhead line to underground cables.
<b>Cable screen</b>	A metallic shield under the outer jacket of a 220 kV cable providing a path for fault currents and ensuring that there is no electric field outside the cable.
<b>Capacitance</b>	A measure of the ability of two insulated conductors to store an electrical charge. A voltage difference will appear between the separate conductive components due the amount charge stored on them.
<b>Capacitive</b>	The property of a circuit element that allows it to store an electrical charge. For example a power cable is a 'capacitor' and a charge is stored within the cable between the conductor and its metallic shield.
<b>Capacitive Coupling</b>	The transfer of voltage from one conductor to another by means of the mutual capacitance between the conductors.
<b>Catenary Curve</b>	The shape of the conductor sag is a catenary curve and is a function of tension, weight and the span length. The longer the span the larger the sag of the conductor for a given conductor tension, and therefore the taller the structure required to support the conductor above the ground.
<b>Cathodic Protection</b>	Cathodic protection protects underground structures such as buried gas or water pipelines through the use of a low direct current (dc) voltage applied by an external source to the structure.
<b>CDEGS</b>	The name of a particular engineering software programme designed to analyse electricity power system earthing, electromagnetic fields, electromagnetic interference and cathodic protection. Its name is made up from the first letters its full title, <u>C</u> urrent <u>D</u> istribution, <u>E</u> lectromagnetic Fields, <u>G</u> rounding and <u>S</u> oil Structure Analysis.
<b>Centreline</b>	Reference to the centreline of the transmission line alignment and easement. A minimum easement width of 65m (32.5m either side of the centreline).
<b>Circuit</b>	A set of three phases (bundles or conductors) plus associated hardware and insulation on a transmission line, which together form a single connection between two or more substations. Also describes a set of EHV underground power cables.

<b>Circuit Breakers</b>	A switching device capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal conditions such as those of short circuit.
<b>Common Mode Interference</b>	Interference that appears on two wires with the same magnitude and phase (i.e. identical characteristics on both wires).
<b>Compressive Ferrule</b>	A connector used to join power cable conductors - a metallic tube which is compressed onto the conductor by the application of a very large force using specialist hydraulically driven tools.
<b>Conductors</b>	Copper, aluminium or steel wire or wire bundles, including stranded, tubular and solid that conduct electricity.
<b>Conductor Sag</b>	The vertical displacement in the conductor from a theoretical chord line between the conductor clamping (attachment) points on adjacent towers and the mid point in the span between the two towers.
<b>Conductor Swing</b>	Conductor swing or "blow-out" is how much a conductor moves sideways under the action of wind.
<b>Corona</b>	Corona (corona discharge) is a low energy plasma produced by the ionisation of nitrogen and oxygen in the air by the electric field at the surface of the conductors of a high voltage transmission line. It can produce audible noise and radio interference and results in a small loss of the energy being transported by the transmission line.
<b>Corona Ring</b>	An aluminium alloy ring fitted to the top and/or bottom of an insulator that spreads and therefore minimises the electrical stresses on the insulator. Generally used for composite insulators to reduce the electrical stress on the insulating material.
<b>Critical Corona Inception Voltage</b>	Also known as Onset Voltage. This is the minimum voltage at which corona is observed. This voltage depends on the conductor diameter, the surface roughness factor of the conductor and atmospheric conditions. A well established mathematical relationship, known as Peek's formula, is used to calculate the corona inception voltage.
<b>Current</b>	The rate of movement of electricity in an electrical conductor is known as the "current", and is measured in Amperes (Amps).
<b>"Danube" style layout</b>	An alternative double circuit tower used in parts of Europe, with only two crossarms on each side. With one phase on the top crossarm and two phases on the bottom crossarm.
<b>DDR</b>	Detailed design report.
<b>Dielectric</b>	Insulating material that does not conduct electricity but may be able to sustain an electric field.
<b>Differential Signalling</b>	A method of transmitting information electrically by means of two complementary signals sent on two separate wires.
<b>Disconnecter</b>	A switch that, when in the open position, provides an isolating distance between electrical circuits.

<b>Double circuit</b>	A double-circuit transmission line is a line where two circuits are carried on one set of towers.
<b>Duplex</b>	Where there are two conductors per phase bundle in a transmission line.
<b>Duplexing</b>	The replacement of a single conductor with two conductors per phase bundle, is commonly referred to as duplexing.
<b>Earth Fault</b>	An electrical short circuit between one or more conductors and the ground.
<b>Earth Grid</b>	A bonded assembly of conductors buried beneath a substation to provide a low resistance connection with the general mass of earth.
<b>Earth Potential Rise (EPR)</b>	A localised voltage rise on the ground surface caused by electrical current flow into the ground.
<b>Earthwire</b>	The purpose of the earthwire is to bond all the structures together and protect the conductors from lightning strikes. Earthwires can also serve as a communication system (for system operation) by utilising an internal optical fibre groundwire that provides signalling for protection systems, and a communication link between substations.
<b>Earth Switch</b>	A switch, which is closed to short circuit normally live conductors to the ground prior to carrying out maintenance.
<b>Easement</b>	A legal instrument registered against a land title which applied over a specified area of land and involves specified interests in the land through a form of agreement. For the Upgrade Project "Easement" also refers to the stage of the ACRE process, when the preferred route has been identified and detailed consultation on the alignment was taking place, resulting in the alignment to which the NORs relate.
<b>EC</b>	Electricity Commission.
<b>Electric Field (EF)</b>	Electric Field present because of proximity of charged conductors, EF occurs whether or not there is current flowing in the conductors.
<b>EGR</b>	Exhaust Gas Recirculation.
<b>ELF</b>	Extremely Low Frequency. The 50 Hz power frequency is considered to be an ELF.
<b>Electromagnetic Interference (EMI)</b>	The electrical equivalent of audible noise, that interferes with the operation of television sets and radios. Also known as electrical background noise.
<b>Electric and Magnetic Fields (EMF)</b>	Electric and Magnetic Fields are intrinsic attributes of any physical electrical system comprising conductors with voltages and currents. Sometimes known as electromagnetic fields.
<b>Electromagnetic Compatibility (EMC)</b>	Electromagnetic Compatibility is the ability of a device to operate faultlessly in a prescribed electromagnetic environment without at the same time affecting its surroundings in a non-permissible way.

<b>Emissions</b>	Electric and Magnetic Fields which are generated by equipment through their use of electricity. Such emissions will vary in frequency and magnitude.
<b>Energised Conductor</b>	A conductor which is livened to the normal operating voltage of the transmission line.
<b>Equipotential Bonding</b>	The electrical connection of conductive components together to prevent dangerous voltages appearing between them.
<b>Equipotential Zones</b>	A work zone where all equipment is electrically interconnected to prevent unsafe potential differences between all parts of the zone while the equipment is in "live" or if it is livened accidentally while workers are present.
<b>Extra High Voltage (EHV)</b>	Electrical power voltage from 66 kV up to 220 kV AC and 350 kV DC.
<b>EUT</b>	Equipment Under Test.
<b>Fault Current</b>	A fault current is an abnormal flow of current in an electric circuit due to a short circuit fault.
<b>Floating Strain (FST)</b>	A conversion of a typical suspension insulator arrangement to a shorter suspension assembly and a pair of in-line strain insulators. Also involves the fitting of a twisted barrel tongue ( <b>TBT</b> ) on the crossarm members. The arrangement is used for raising the conductor attachment point for line uprating.
<b>Frequency</b>	Frequency is the rate of cyclic change in value of current and voltage, quantified by the international standard term "Hertz" (Hz). Electrical power frequency around the world is almost exclusively 50Hz or 60 Hz.
<b>Gas Insulated Switchgear (GIS)</b>	Metal-enclosed switchgear in which the insulation and arc extinction is obtained by an insulating gas, usually SF6. GIS has no electrical conductors exposed to the atmosphere, except at the points where overhead transmission lines are connected to it.
<b>Ground Flash Density</b>	The number of lightning flashes to ground per square km per year.
<b>Grid Investment Test (GIT)</b>	Grid Investment Test is an economic test designed to select the investment option that provides the greatest expected net market benefit when compared to a number of alternatives.
<b>Gridtracker</b>	Transpower's consultation database.
<b>Hanger Bracket (HB)</b>	A "V"-shaped steel component sometimes used to attach an insulator assembly to a transmission structure.
<b>Hazardous Voltage</b>	A voltage that may result in electric shock which in turn may result in harm to a human or animal or damage to electrical equipment.
<b>Heavy Strain Tower</b>	see Strain Towers.

<b>Heavy Suspension Tower</b>	see Suspension Towers.
<b>Hertz</b>	see Frequency.
<b>High Voltage</b>	Depending on context, can be one or more of: <ul style="list-style-type: none"> <li>• The set of voltage levels in excess of low voltage (LV).</li> <li>• In terms of the Electricity Regulations 1993, any voltage exceeding 1000 V ac or 1500 V dc.</li> <li>• In terms of general usage in Transpower, the voltage on the highest voltage terminals of a power transformer.</li> </ul>
<b>HVAC</b>	High voltage alternating current.
<b>HVDC</b>	High voltage direct current.
<b>ICNIRP</b>	International Commission on Non-Ionizing Radiation Protection. This internationally constituted body of independent scientific experts addresses issues of possible adverse effects on human health of exposure to non-ionising radiation.
<b>IEEE</b>	Institute of Electrical and Electronics Engineers, Inc. This international body develops and maintains standards and guidelines relating to existing and new technologies.
<b>ICES</b>	International Committee on Electromagnetic Safety. A committee of the IEEE.
<b>Impedance</b>	A measure of the opposition to current flow.
<b>Immunity</b>	An inherent or designed ability of equipment to withstand the influence of external electric and magnetic fields.
<b>Inductance</b>	The property of an electrical conductor whereby energy is stored in a magnetic field. The level to which a magnetic field stores energy is a measure of its inductance, measured in Henries (H).
<b>Instrument Transformer</b>	A transformer which is used for obtaining measurements of a high voltage or current, by reducing them to a low value suitable for control, instrumentation, metering and protection purposes.
<b>Insulators</b>	Unit or assembly of units intended to give support to a live part, which is to be insulated from earth or another live part. They can be made of porcelain, glass or a composite polymer. They can be either a string or cantilever post configuration.
<b>Joint Bay</b>	An underground concrete bunker or pit where underground cables are joined together.
<b>Lattice tower</b>	A lattice steel structure used to suspend conductors above the ground at the required electrical clearance. They most common type of transmission line structure used in New Zealand.

<b>Lightning Protection</b>	Includes masts and wires to shield substation equipment from direct lightning strikes; protects equipment connected to antennas, power lines, telephone and data circuits.
<b>Light Strain Tower</b>	see Strain Towers.
<b>Light Suspension Tower</b>	see Suspension Towers.
<b>Line Ratings</b>	Line ratings define the limiting values of electrical power (Voltage x Current) that a circuit can carry without violating safe clearance distances or other parameters such as Electric and Magnetic Field, or Radio Frequency Interference.
<b>Link Box</b>	A lockable, earthed, metal enclosure constructed to accommodate sheath sectionalising and other circuit earthing components for underground power cable circuits.
<b>Lux</b>	A unit of measurement of light intensity. As a guide, current standards recommend that public parking areas are lit to an average of 7 lux; or The SI unit of illuminance, equal to one lumen per square metre.
<b>mA/m<sup>2</sup></b>	Milliamps per square metre.
<b>Magnetic Field (MF)</b>	The force experienced in a region of space around a current carrying conductor. It is measured in amperes per metre (A/m). The density of this field is often expressed in the unit microtesla ( $\mu$ T).
<b>Maximum Operating Temperature</b>	The maximum temperature that the conductors of a circuit may be permitted to operate at under any conditions including the worst combination of load current, solar radiation, ambient temperature, and no wind. The maximum operating temperature sets the maximum load current the circuit can carry, and defines the conditions that produce the lowest ground clearance of the conductor.
<b>Mid Span Joint (MSJ)</b>	A joint in a phase conductor to either replace an existing repair sleeve or join two sections of conductor. The conductor is temporarily held, cut, and the new joint fitted. May also be required at the ends of the Nip & Tuck sections of work where some conductor is removed. Also used during construction to join separate drum lengths of conductor.
<b>Monopole(s)</b>	Monopoles used for transmission line structures are a single pole structure, generally of tubular steel construction made up of a number of shorter length sections that are combined together by either overlapping joints or by bolted end plate connections. The sections can be circular, but for larger structures they are generally multi sided, eg 16 sides to facilitate their practical manufacture. As the resulting over-turning load increases down the pole, they are also generally tapered, increasing in diameter from top to bottom. They can be direct embedded in the ground, but are generally attached to a separate foundation using anchor bolts set in concrete. Phase and earthwire supporting crossarms are in turn attached, either welded or bolted, to the individual pole sections as required.
<b><math>\mu</math>T</b>	microtesla unit of measure of magnetic field strength.

<b>NAaN Project</b>	The North Auckland and Northland Upgrade Project.
<b>National Radiation Laboratory (NRL)</b>	A specialist unit of the Ministry of Health based in Christchurch, New Zealand. It provides a resource of expert advice, service provision and research capability on matters concerning public, occupational and medical exposure to radiation, the performance of radiation equipment and the measurement of radiation and radioactivity.
<b>Nip &amp; Tuck</b>	A method to increase the tension in part of a line strain section, to increase ground clearances within that part of the overall strain section. Some conductor is cut out and re-terminated to achieve the increase in tension, and the conductor is moved along the section being modified.
<b>Non-ionising Radiation</b>	Radiation that does not produce ionisation in matter. When radiation of this nature passes through the tissues of the body it does not have sufficient energy to damage DNA directly.
<b>Normal Operating Conditions</b>	Normal operating conditions are when both circuits are in service. The circuits would generally share the load equally. It is the situation that would occur for the majority of the time.
<b>NZCEP34</b>	The New Zealand Code of Practice for Electrical Safety Distances Number 34: 2001, published by the Ministry of Economic Development.
<b>Onset Voltage</b>	See Critical Corona Inception.
<b>Optical Fibre Ground Wire (OPGW)</b>	A metallic conductor used as an earthwire for a high voltage transmission line that contains as an integral part of its internal construction, optical fibres used for communications purposes.
<b>Overhead Earth Wire (OHEW)</b>	Conductor which is installed between towers to provide lightning shielding and earthing for the transmission line.
<b>Phase</b>	In most EHV electrical power systems each electrical circuit is made up of three phases, with each phase at the same voltage within the circuit, e.g. 220kV. A phase can be a single conductor or a multiple sub-conductor bundle.
<b>Phase Shifting Transformer</b>	A phase-shifting transformer is a special type of power transformer that is designed to increase or decrease the power flow in a transmission circuit. It is used to control the proportion of power flowing in each of two or more parallel circuits.
<b>Phase Transposition Site</b>	For three phase transmission, especially for long double circuit lines, the vertical order in which phases (commonly called Red, Yellow and Blue) are hung on the towers needs to be changed. The process is called Phase Transposition. Each phase needs to occupy each position (top, centre & bottom) on the towers for approximately equal lengths of the circuit. The objective of this reconfiguring is to balance the impedance of lines which could lead to unbalanced voltages at the receiving end. Two transpositions sites are required to create three equal lengths on the line.
<b>PLS-CADD</b>	An overhead line design modelling program developed by Power Line Systems (USA), that works in 3 dimensions including both the terrain crossed and the line itself.

<b>Power</b>	Power is the rate of flow of energy past a given point and is the product of voltage and current. It is measured in watts (or megawatts (MW), in the case of electrical power systems).
<b>Power Factor</b>	The ratio between real power and apparent power in a circuit is called the power factor. The neutral power factor is 1.0 or unity, but AC power systems typically operate between 0.95 and 1.05.
<b>Power Station</b>	A switching station that was originally built as an integral part of a generation site by the New Zealand Electricity Department or its predecessors. When the Government separated generation and transmission in 1993, the switching station became part of the transmission network but retained the power station title.
<b>Power Transformer</b>	A device to step the electrical voltage up and down between generation, transmission and distribution systems. For the Upgrade Project, the voltage transformation will be between 220,000 volts and 400,000 volts (or in electrical engineering terms, between 220 kV and 400 kV).
<b>Protection Relays</b>	An device that detects electrical faults on the electricity transmission grid to automatically remove an individual line, transformer or cable circuit from service.
<b>R<sup>i</sup></b>	Route (identify alternative routes within preferred corridor).
<b>R<sup>ii</sup></b>	Route (identify and confirm preferred route after consultation).
<b>Radio Frequency Interference (RFI)</b>	Radio Frequency Interference, is a phenomenon where stray signals generated in high voltage equipment can interfere with the operation of some electrical equipment i.e. AM radio receivers.
<b>Reactance</b>	The property of an electrical conductor or circuit whereby energy is stored in a magnetic field (inductance) or an electrical field (capacitance).
<b>Reactor</b>	A device consisting of one or more coils of conductor designed to have a particular inductance (inductive reactance).
<b>Resistance</b>	The property of an electrical conductor or circuit whereby energy is consumed and dissipated as heat.
<b>Resistivity</b>	A measurement of resistance of a material per unit area and length.
<b>Rimu AAAC</b>	A 38.7 mm diameter non standard All Aluminium Alloy Conductor.
<b>Ripple Control Plant</b>	Substation electrical equipment that enables a power company (usually a distribution lines company) to switch off electrical load at a customers premises during periods of peak electricity demand and to switch it on afterwards. The commonest use is the control of domestic water heating.
<b>RMA</b>	The Resource Management Act 1991.
<b>Rules</b>	Electricity Governance Rules.

<b>Seismic Liquefaction</b>	Seismic Liquefaction is when water saturated loose soils tend to lose their strength when subjected to ground shaking during an earthquake event. A common effect is the translational failure of a block of land on a soil layer that has lost strength, which in turn may affect structures supported in that block of land.
<b>Series Capacitors</b>	Series capacitors are an electrical plant designed to reduce the reactance of a transmission circuit and enable it to carry more power (up to the maximum permissible operating current).
<b>Series Reactors</b>	Series reactors are an electrical plant designed to increase the reactance of a transmission circuit and reduce the amount of power that naturally flows in it.
<b>SF6 (Sulphur Hexafluoride Gas)</b>	A synthetic gas with very good dielectric properties, used in electrical equipment.
<b>Shunt Capacitor Bank</b>	A bank of capacitors connected to live conductors of a power system. It is used to support the voltage for the power system.
<b>Shunt reactor</b>	A reactor connected between earth and the live conductors of a power system, for the purpose of absorbing reactive power. It is commonly used to compensate for the natural capacitance of power cables of long transmission lines.
<b>Simplex</b>	A phase consisting of a single conductor per phase.
<b>Soil Resistivity</b>	Measure of soil's opposition to current flow. Soil resistivity is the key factor that determines what the resistance of a grounding electrode will be, and to what depth it must be driven to achieve low ground resistance.
<b>Span Length</b>	The horizontal distance between two adjacent transmission line structures.
<b>Step Voltage</b>	The voltage difference experienced between a person's feet, where feet are 1m apart near a transmission line tower or substation when fault current is flowing into the ground (associated with EPR).
<b>Steady State</b>	Refers to the normal ac operation of the line.
<b>Strain Towers</b>	This type of tower allows the conductors to be terminated or strained off, i.e. the insulators are in line with the axis of the conductor. They are used where there are moderate to large turn-off angles in the alignment; where due to the terrain shape there is uplift of the conductors; where for line security reasons, a failure containment structure is required; or where a line ends at a substation. There are generally Light and Heavy strain towers, with the heavy strain tower being used for the larger turn-off angles and for line termination at substations.
<b>Substation</b>	A building, structure or enclosure incorporating electrical equipment used principally for the control or distribution of electricity. A substation is usually defined as an electricity station that has power transformers.
<b>Substation Gentries</b>	Inverted U or H shaped steel structures to support the ends of incoming transmission line circuits and substation strung busbars.

<b>Sub-conductor</b>	One conductor in a bundle of conductors comprising a phase (e.g. a triplex bundle comprises 3 sub-conductors).
<b>Sulphur AAAC</b>	The code name for 33.8 mm diameter standard All Aluminium Alloy Conductor.
<b>Surface Voltage Gradient</b>	The surface voltage gradient is a function of the voltage of the conductor, the conductor diameter (also the conductor bundle diameter in case of a duplex formation), the surface roughness factor of the conductor and atmospheric conditions.
<b>Surge Arrester</b>	A device designed to protect electricity apparatus from high transient voltages, they are connected between the electrical conductors of a network and earth to limit the duration and frequently also the amplitude of following current.
<b>Suspension Tower</b>	These are generally the most common type of tower on a line, and are used to support (suspend) conductors via an insulator arrangement that is generally perpendicular to the axis of the conductor. They are used where the alignment has nil to moderate turn-off angles in the alignment. Sometimes referred to as tangent towers. These are generally Light (or Standard) and Heavy suspension towers, with the heavy suspension towers being for the upper level of loading for this tower type, including where longer span lengths are required.
<b>Static var Compensator (SVC)</b>	An installation of capacitors, reactors and switching equipment that will react instantaneously to changes in the reactive power flows or voltages on the grid to keep the voltage stable.
<b>Switchgear</b>	A general term covering switching and interrupting devices and their combination with associated control, metering, protective and regulating devices. Used primarily in connection with the generation, transmission, distribution and conversion of electric power; or  A collective term for switches of all types and their associated equipment, including circuit breakers, disconnectors, and earthing switches.
<b>Switching Station</b>	A building structure or enclosure incorporating equipment used principally for the purposes of transmission of electricity rather than supply; or  An electricity station without power transformers.
<b>Switchyard</b>	An area, enclosed by a security fence, containing normally live conductors and other live electrical equipment (circuit breakers, disconnectors, power transformers, etc).
<b>Synchronous Condensers</b>	A dynamic reactive support device that will react instantaneously to changes in the reactive power flows or voltages on the grid to keep the voltage stable.
<b>Tensile Strength</b>	A measure of the stress required to pull (tension) something such as rope, wire, or a structural member to the point where it breaks.

<b>Thermal Uprating</b>	A process to increase the maximum operating temperature of a transmission line. This may involve undertaking remedial works in spans that would not otherwise meet statutory clearance requirements under the increased conductor temperature.
<b>Tie Line</b>	A short transmission line between two adjacent substations or separate areas of one substation, to connect them electrically as one.
<b>Tower</b>	Generally a lattice steel structure used to suspend conductors above the ground at the required electrical clearance.
<b>TOWER</b>	A companion program to PLS-CADD used for structural modelling of steel lattice structures. This program was also developed by Power Line Systems (USA).
<b>Tower Footing Resistance (TFR)</b>	The resistance of a tower's foundation to the flow of electrical current, during an earth fault. This value is dependent on soil resistivity and tower foundation type.
<b>Tower Weight</b>	Tower weight is the total weight of structural steel in a transmission line tower excluding the foundations. It is dependent on the purpose of the tower and the associated mechanical loadings. Weights will vary from approximately 10 tonnes for a light suspension tower to over 50 tonnes for a heavy strain tower.
<b>Touch Voltage</b>	The voltage difference experienced between a person's hand and foot, where the foot is 1m horizontal distance from the object being touched at a transmission tower or substation fence.
<b>Transferred Voltage</b>	Potential rise of an earthing system caused by a current to earth transferred by means of a connected conductor (for example, cable metal sheath, pipeline, rail) into areas with low or no potential rise relative to reference earth.
<b>Transformer</b>	see Power Transformer.
<b>Transition Station</b>	see Cable Transition Station.
<b>Transmission Circuit</b>	A system of conductors that comprise a three phase electrical connection between stations in the power system. It is a set of cables or overhead conductors (three for AC, two for HVDC) plus associated hardware and insulation on a transmission line, which together form a single electrical connection between two or more stations.
<b>Transmission Losses</b>	The energy or power losses on a transmission circuit that are caused by the resistance of the conductor material. This energy/power is converted to heat and dissipates to the air (or ground in the case of underground power cables).
<b>Transmission Towers</b>	see Tower.
<b>Transposition Section</b>	see Phase Transposition.

<b>Trefoil Arrangement</b>	An arrangement of three power cables laid in a triangular configuration, either touching each other or separated by a small distance.
<b>Triplex</b>	An arrangement of three conductors per phase on an overhead transmission line. Commonly called a “triplex bundle”.
<b>Twisted Barrel Tongue (TBT)</b>	Similar in function to a hanger bracket, but much shorter for attaching to the insulator. A TBT provides a swivelling attachment at the upper end, and a tongue or small plate attachment at the lower end.
<b>Voltage</b>	The name for electrical pressure (unit is Volt (V)); it is analogous to the pressure of water in a pipeline. The highest voltages in a power system are used for transporting bulk electricity from generation stations to areas of demand.
<b>XLPE</b>	An acronym for Cross Linked Polyethylene. Used to insulate the conductor in underground cables to prevent it coming into contact with the earth.