and recommended by its Consultants in line with best practices.

TREE TRIMMING AND POWER LINES

Energy Fiji Limited (EFL) appreciates public cooperation in keeping trees away from power lines. This brochure has been produced to show how you can help.

EFL'S primary role is to provide a safe and continuous supply of electricity. However, trees and broken branches may fall onto power lines and cause power cuts. In some instances the damaged or broken power lines may pose great danger to life.

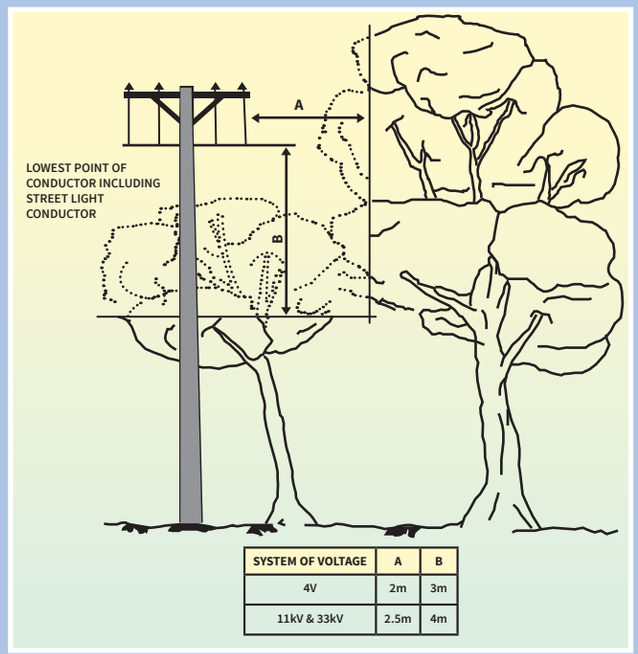
Planned power shutdowns are organized to trim down trees/ branches in the vicinity of power lines to avoid unplanned power outages.

Vegetation management is becoming a costly exercise for the Authority and also causes inconvenience to our valued customers in the event of power outages.

Trees should be trimmed to discourage growth towards power lines. The best policy is not to plant trees close to power lines; low trees and shrubs are the best.

HAZARDS TO AVOID

Power lines should not be allowed to come in contact with any object. If you see a dangerous situation, inform EFL immediately. Phone details are outlined at the end of this brochure.



SYSTEM OF VOLTAGE	A	B
4V	2m	3m
11kV & 33kV	2.5m	4m

Trees

Trees and power lines are just not compatible. Plant trees well away from lines and keep any branches trimmed before they become a problem.

Kites

Flying kites near power lines is extremely dangerous to the kite flyer and can disrupt power to other customers.

Broken Lines

If a line is broken during a storm, or an accident, keep well clear, keep others clear and inform EFL immediately.

Bush Fire

Never light fires near power poles. If you happen to see bush fires near power lines please inform EFL immediately.

SAFETY FIRST

Teaching your Family

Your family should be made aware at an early age of the presence of power lines and on the safety precautions needed in everyday activities.

Remember that trees and branches conduct electricity. Unless you are professionally qualified to do so, you should not attempt to trim trees in the vicinity of power lines without obtaining advice from efl. This advice is free and will enable you to carry out the operation safely. In some circumstances the operation can not be carried out safely unless the power line is turned off. EFL will advise if this is necessary and, if so, arrange for it to be carried out.

Never climb above the power line, and keep yourself and all tools, such as saws, or axes, outside the clearing space for safety.

Be careful when moving ladders near power lines. Aluminum and wire reinforced ladders conduct electricity and are not recommended to be used near power lines.

Never hold by hand any branch being trimmed if there is even a remote chance of it touching power lines.

Only hand –tools should be used when trimming from a ladder or climbing a tree. Not chainsaws.

For further information contact:

Energy Fiji Limited
Private Mail bag
Suva
Fiji Islands

EFL Contact Centre : **132 333(24 hrs)**
Website : **www.efl.com.fj**
Fax Number : **3313064**
Email : **CustomerS@efl.com.fj**
For Emergencies Only : **913**

energising our nation

GENERAL INFORMATION

Power Lines Underground Cables and You

WHAT IS ELECTRICITY ?

Electricity is a natural or physical phenomenon whereby any physical medium becomes in excess of electric charge of either negative or positive polarity with reference to the general mass of earth which is at zero potential. Electricity is a type of energy fuelled by the transfer of electrons within a conducting medium.

Electricity is widely used for providing power to buildings, electrical devices and some automobiles.

Static Electricity

Electric charges are naturally generated and stored in a medium in its vicinity. For example, the clouds in the sky at different heights will get charged with ionized particles in the atmosphere due to solar/cosmic activities. If the layers of clouds acquire excessive charges, they tend to charge to the mass of earth with a flash of lightning due to displacement current.

In fair weather, the lower atmosphere contains a static electric field of approximately 0.15 kilovolts/m. During a thunderstorm, the electric field strength between the ground and the clouds can reach up to several kilovolts/m.

Normally the lightning stroke finds the easiest path to ground and thus it will strike the highest point on the ground, such as tall buildings, peak of hills, tower structures, etc.

The lightning stroke currents may be as high as 10,000 A and will tend to impart all it's energy on any object it strikes and cause substantial damage to it or cause death of a living entity.

Static electricity is also generated if a piece of glass rod is rubbed on a wooden surface or due to friction through the movement of clothing. This is the reason that you may experience a shock in your hand when you touch a metallic door handle after walking on a carpet or rug.

These shocks can be unpleasant but are harmless even though voltages up to 20 kilovolts may be generated.

Static electricity do not serve any purpose to us in our normal life but we need to live with it.

Word of Caution:

During lightning storm stay away from tall structures and power line structures. Some sensitive electric components may get damaged due to excessive discharge of static electricity and thus avoiding touching them with bare hands.

Conventional Electricity:

With conventional electricity the electric charges are forced to circulate in a conducting medium to supply a connected load by constant charge generator (wet & dry batteries, generators, solar cells, etc).

A load is a term used for any electrical device/appliance connected to the supply system which consumes electricity.

Electricity flows easily in any conducting medium: such as metals, semi-conductors, water content objects because of their chemical ionic structures. Plastic, rubber, ceramic, glass and some organic compounds are examples of good insulating mediums (bad conductors)

Both conductors and insulators play vital role in the business of generating, transmitting, and distributing electrical energy to our valued customers.

An electric current flows in a closed circuit when a voltage (electrical pressure) is applied to resistive load .Based on the simple Ohm's law: the value for current flowing in the circuit is proportional to the applied voltage and inversely proportional to the resistance of the load; that is I=V/R.

In our daily life it is the value of the resistance component of a connected load, that determines the power demand from the power supply.

Power is consumed in any conducting medium when significant electric current flows through a resistance component in a load.
Thus, power can be evaluated by the formula; $P=I^2$ R Watts
For example, an incandescent lamp (bulb) will have special resistive filament, selected from a metal, enclosed in bulb filed with special gas to glow when electric current flows through it.

EFL SUPPLIES its customers with either a single phase, two wire 240 volts, a two phase, three wire 415 volts or a three phase, four wire 415 volts alternating current supply.

EFL charges it's customers for the total Energy consumed over a period:

Energy = Power x Time (Watt – hour)

One unit of energy is equivalent to 1000 watts - hour,
1000 watts consumed in one hour.

EFL's POWER GENERATION & NETWORK

Energy Fiji Limited (EFL) generates power using either water driven turbine generators or diesel engine driven. The Monasavu dam is located approximately 7kms away from Wailoa Power Station and supplies water to the turbines through low and high pressure tunnels.

The EFL has also built a dam in Nadarivatu. A couple of small turbines which run from natural flow of river water have been installed at Wainiqeu in Savusavu as part of an aid program from the Chinese Government. Conventional Power Stations that generate power using diesel generators are located at Kinoya, Vuda, Labasa, Savusavu, Levuka, Rokobili, Deuba, Korovou, Sigatoka, Qeleloa, Namaka and Rakiraki.

The system frequency of the power supply is normally controlled to 50 Hertz (cycles/second), whilst the generated voltage level ranges from 415 V to 11,000 Volts.

In reality power stations are located in remote areas due to availability of natural resources and infra-structural benefits. The authority uses extra high voltage of 132,000 Volts on the power transmission lines constructed on steel towers from Wailoa to two major despatch centres: namely, Cunningham road (in Suva) and Vuda (in the West) sub-transmitted stations.

Power to the various load stations (towns) are then sub –transmitted by use of the 33,000Volts sub-transmission lines.

The voltage at each zonal distribution station is stepped down to 11,000 volts from 33,000 volts for local area distribution using distribution power lines. Thus, bulk of the power structures in urban, sub-urban and rural areas consists of power lines with voltage levels of both 11,000 volts and low voltage(240-415 Volts).

EFL's Role in Managing its network Assets

The major factors that contribute to unplanned power outages are:

- Broken power poles/ Wires due to vehicle accident;
- Broken wires due to trees/ branches falling on them;
- Damaged line support insulators and wooden power poles due to vandalism;
- Vegetation/ Trees near power lines;
- Equipment and hardware failures;
- Lightning Stroke.
- Natural disasters (cyclones hurricanes, floods)
- EFL has taken stringent steps in managing its network assets to ensure that its customers enjoy reliable and quality power supply.

Pro-active action is taken in managing vegetation and trees near power lines with planned shutdown of power lines to remove them. The general public are requested to assist the Authority in notifying immediately, of any defect or dangerous/hazardous situation.

EFL has already introduced "Live-line Maintenance Works'' on its 132 kV transmission lines, that transport power from Wailoa to Suva and Vuda in the west. In order to minimise customer interruptions related to planned maintenance EFL introduced "Liveline" maintenance works on its 132kV transmission lines that transport power from Wailoa to Suva and Vuda in the late 1990's. In the 2000's this capability was extended to Liveline maintenance work on the 33kV sub-transmission and 415/240 Volt distribution lines.

Polymer housed insulators for the power lines support are now commonly used as a replacement to the ceramic type to minimize mechanical damages.

A more thorough condition monitoring program on electrical plants and equipment in the system are now in place to manage untimely equipment and hardware failures.

EFL is also following up with maintenance programs as identified