

Substations

What's a substation?

An electrical substation is part of an electrical distribution system where voltage is changed from high to low or vice versa using step-up or step-down transformers. They are usually easily recognisable as fenced or walled off compounds into which lots of overhead cables run. They may also emit a noticeable humming sound.

Transmission substations

Transmission substations are used to connect several high voltage lines. If the lines are at the same voltage they may just contain high voltage switch gear. If the voltages are different then transformers will be necessary to raise or lower the voltage of one line so that it is the same as the other.

Distribution substations

Distribution substations are used to lower voltages from the high voltage transmission lines to medium voltage from 2.4 to 33 kV. This electricity will then be supplied via overhead or underground power lines to distribution transformers in the neighbourhoods where it will be used. These transformers will step the voltage down to 240 volts for domestic premises and 415 volts for small businesses.

Collector substations

In situations where electricity is being generated over a wide area, such as at a wind farm, collector substations are used to provide a common point at which the voltage can be stepped up for supply to the grid.

Switching

Substations are also important in allowing grid controllers to switch particular transmission lines on and off. This can be necessary to allow maintenance on particular sections of line, while ensuring that users receive an uninterrupted supply.

Being able to switch off sections of line is also vital in dealing with faults. If, for example, a tower is damaged by a lightning strike and starts to arc to earth the whole distribution system can be destabilised if the fault is not isolated quickly.

