

Electric Transmission Overview

Electric transmission

Electric transmission is the process by which large amounts of electricity produced at power plants (such as hydro, thermal and wind) is transported over long distances for eventual use by consumers. Due to the large amount of power involved and the properties of electricity, transmission normally takes place at high voltage (69-kilovolt or above) to reduce losses that occur over long distances. Electricity is usually transmitted to a substation near a populated area. At the substation, the high voltage electricity is converted to lower voltages suitable for consumer use, and then transmitted to end users through relatively low-voltage electric distribution lines that are owned and operated by local electric utilities.

The construction, operation, and maintenance of new high-voltage transmission lines and associated facilities create a range of environmental impacts. The type and magnitude of these impacts varies depending on line type, size, and length, and a variety of other site-specific factors. The main components of high-voltage electric transmission lines and associated facilities include the following:

Transmission towers

Transmission towers are the most visible component of the electric transmission system. Towers support conductors (cables that transmit the electricity, otherwise known as lines) above the ground and separate them from other lines, buildings, and people. Towers vary in design and dimensions. In general for a 500-kV line, a 150-foot right-of-way would be needed for the area around the towers and the spans between the towers.

Conductors (transmission lines or wires)

Conductors are the cables on the transmission towers that carry the electricity to substations. There are generally three conductors on each tower. Conductors are constructed primarily of twisted metal strands, but newer conductors may incorporate ceramic fibers in a matrix of aluminum for added strength with lighter weight.

Fiber optic cable

A fiber optic cable is sometimes strung on the transmission towers below the conductor. Fiber optic cables could have up to 72 fibers. The fiber is used for communications as part of the power system. Fiber optics technology uses light pulses instead of radio or electrical signals to transmit messages. This communication system can gather information about the system, such as which transmission lines are in service and the amount of power being carried, meter reading at interchange points, and status of equipment and alarms. The fiber optic cable allows voice communications between power dispatchers and line maintenance crews and provides instantaneous commands that control power system operations.



Right-of-way

The right-of-way for a transmission corridor includes the land set aside for the transmission line and associated facilities, and land set aside for a safety margin between the line and nearby structures and vegetation. Having the safety margin helps avoid the risk of fire and other accidents. The right-of-way is also used for access roads. BPA follows new regulations to prevent outages and protect public safety. Vegetation that could pose a danger to a transmission line or tower is removed inside the right-of-way, and outside the right-of-way if it could come too close to lines and towers. On the right-of-way, low-growing vegetation is allowed to grow after construction and disturbed areas are reseeded with native vegetation to prevent the spread of noxious weeds.

Access roads

Access is needed to the transmission tower sites for both line construction and maintenance. Grading and clearing vegetation may be required for access road construction. Roads are usually graveled. Access roads can be permanent or temporary depending on the need during construction and land use. On most rights-of-way, permanent access roads provide a way to repair and maintain the towers and line and are available for emergencies. Access roads are sometimes required outside the right-of-way to cross streams, and avoid wetlands and other resources.

In cropland and other areas where the existing land use is not compatible with a permanent access road, BPA uses temporary access roads during construction, then removes the roads and replants or otherwise restores the original land use.

Substations

The high voltages used for electric transmission (e.g., 500 kV) are converted for consumer use to lower voltages (e.g., 13.8 kV) at substations. Substations vary in size and configuration but may cover several acres, and are cleared of vegetation and surfaced with gravel. Access is limited to authorized personnel and the substation is fenced and gated for safety and security. In general, substations include a variety of structures, conductors, fencing, lighting, and other features that result in an "industrial" appearance.