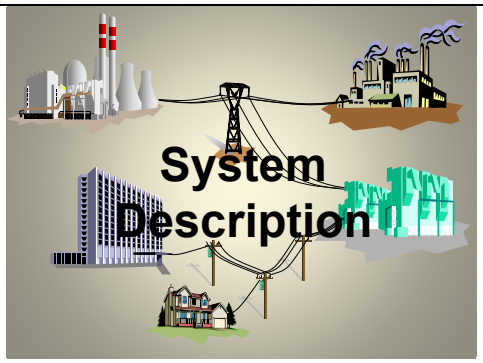
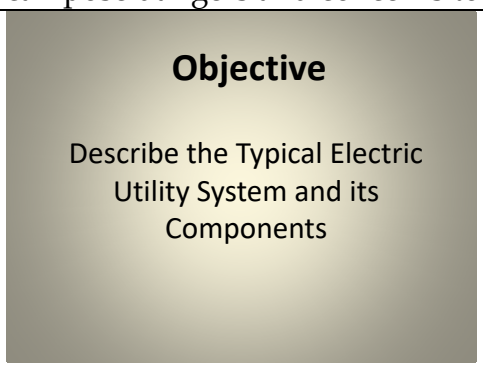
Unit 3: System Description

Slide 1



The Electric Utility System is made up of many parts and components that generate, manage, and move that electric current from one place to another. Some areas within the system are more susceptible to causing wildfires, but anywhere within the system can pose dangers and concerns to the Fire Investigator.

Slide 2



This section will provide you with the basic understanding of the system and how the components operate as one.

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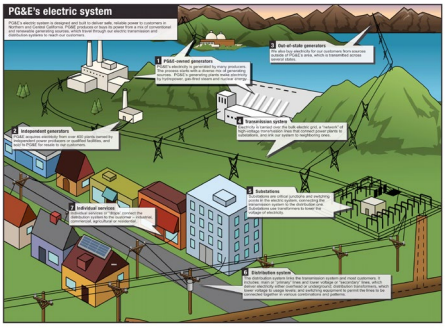
Slide 3



Each Electric Power Company has these same basic components. This is a sample of the Pacific, Gas and Electric Company's System.

Slide 4

Make the following key points:

- Electricity differs from other products because it is manufactured and used at the same instant.
- Electricity is manufactured at the generation facility;
- It is then transported in bulk via the lines and towers to a distribution center (substation);
- It is then broken down into small units and routed over the Primary Distribution lines and poles; and,
- Then it is further broken down into customer ready levels and delivered through Secondary Distribution lines and poles to the service drops leading to the customer's business and residential meters.

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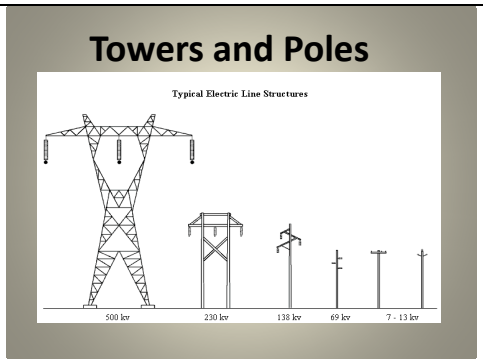
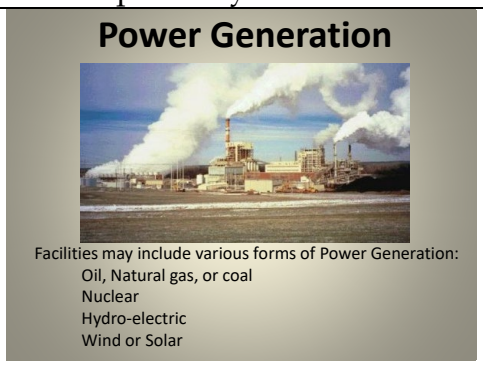


Make the following key points:

- The system incorporates numerous types of towers and poles to hold the lines and equipment that will carry the electricity through the system.
- It is important to know the difference and what types of systems are within your area.
- Some of the poles may incorporate both types of Distribution Lines.
- We will cover these in greater detail when talking about the specific systems.

Slide 6



Make the following key points:

- In all but the solar generation facilities, some form of turbine that is driven by steam, wind, or water movement.
- That turbine is attached to a generator that produces the electricity.
- The voltage of that electricity may vary depending on the installation, but usually runs in the 13,000 to 25, 000 volt range.

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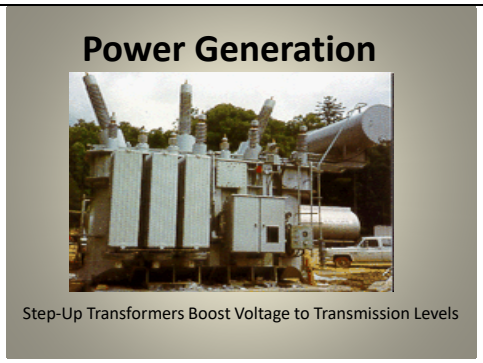

Make the following key points:

- It is then boosted by step-up transformers to the higher voltage required for transmission over long distances. The voltage at this point is between 36, 000 kilo volts (kV) or 36 kV to 500,000 kilo volts or 500 kV.
- These areas normally do not pose a significant threat for causing wildfires as they are usually, large open areas of concrete construction, well cleared of vegetation and methods to carry fire out of or into the power generation facilities.

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Make the following key points:

- Circuit-Transmission: High Voltage circuit (50 kV to 500 kV) between generating source and substation (switchyard).
- These circuits include various types of towers or poles.

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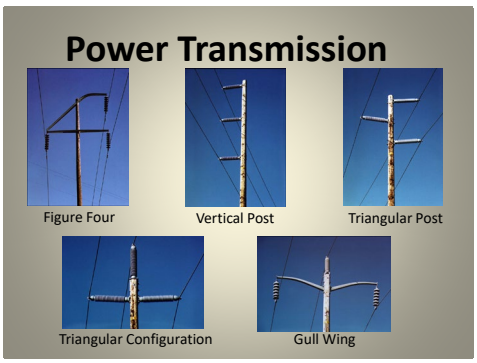
Slide 11



Make the following key points:

- When Poles are incorporated into the Transmission System, they may include various designs.
- The locations of these towers, poles, lines, and substations, normally pose a moderate threat for causing wildfires. Depending on the vegetative clearances adjacent to these facilities the number of fires caused is relatively low.

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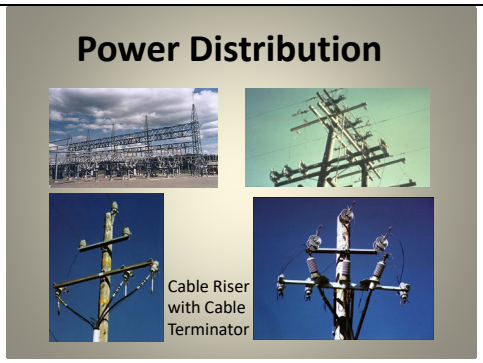
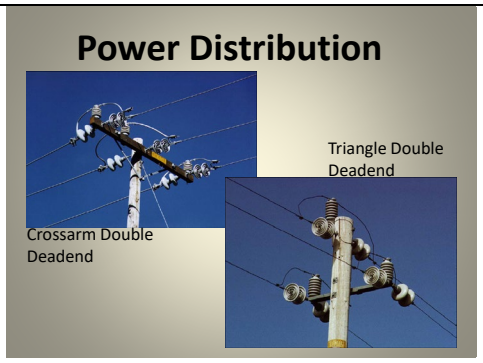


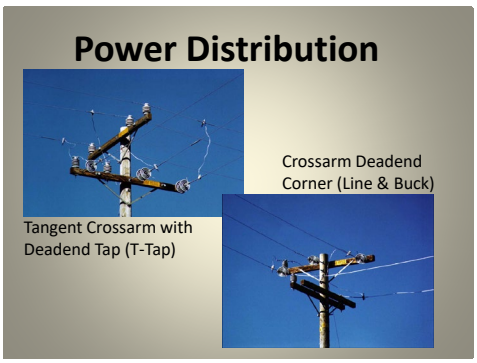
Make the following key points:

- Once arriving at the Substation (switchyard) the power is stepped-down in voltage for the Distribution Lines or Circuits.
- Circuit Distribution: Circuit between Main Substation (switchyard) and point of use.
- Circuit Primary Distribution: High Voltage Circuit (2.4 kV to 35 kV) between Main Substation (switchyard) and service transformer.

Slide 13



Slide 14



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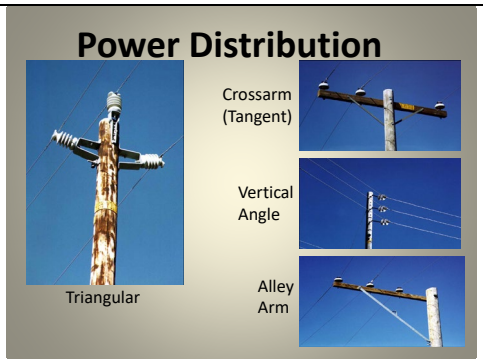
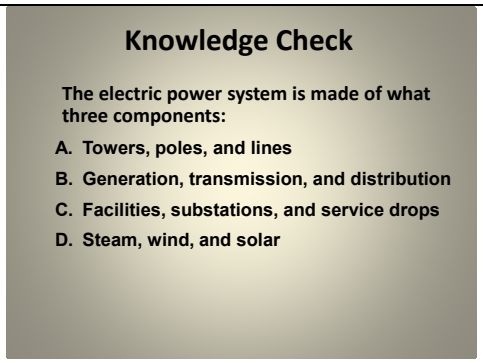


Make the following key points:

- The power distribution system has a high threat for causing wildfires. This is due to the type of hardware normally employed within the distribution system and the fact that the miles of distribution lines outnumber the transmission lines by 5 -10 times.

Slide 16



The electric power system is made of what three components:

A. **Towers, poles, and lines**
B. **Generation, transmission, and distribution**
C. **Facilities, substations, and service drops**
D. **Steam, wind, and solar**

The correct answer is: B.

The electric power system is comprised of power **generation** facilities that use various methods to generate electricity; **transmission** lines comprised of towers, poles, lines, substations and ancillary equipment; and, **distribution** lines comprised of poles, lines, transformers and ancillary equipment.

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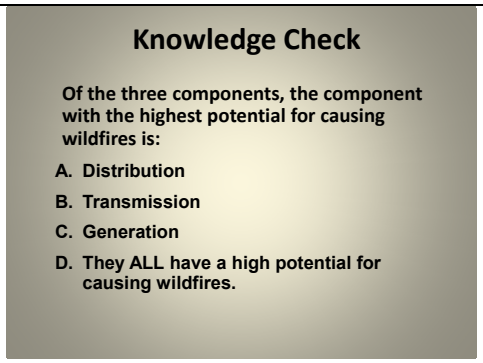

Of the three components, the component with the highest potential for causing wildfires is:

A. **Distribution**
B. **Transmission**
C. **Generation**
D. **They ALL have a high potential for causing wildfires.**

The correct answer is: A.

Although wildfires can occur from all three of the components, the one with the highest potential is distribution due to the high number of miles of line and the types of ancillary equipment that are known ignition sources.

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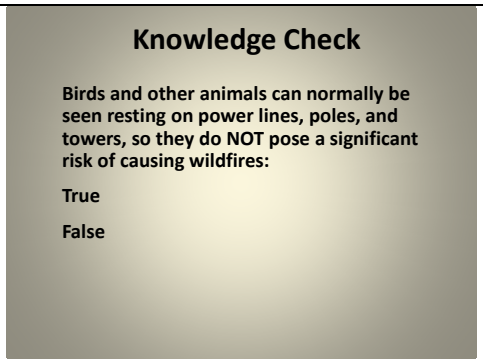

Birds and other animals can normally be seen resting on power lines, poles, and towers, so they do NOT pose a significant risk of causing wildfires:

True

False

The correct answer is: False.

Birds and other animals have caused numerous wildfires when they come into contact with the conductors or ancillary equipment and cause faults and discharges of electric energy. This is a common occurrence and the electric utilities are required to take the potential for animal contacts into consideration when constructing their systems and facilities.

We'll talk about some of those ancillary equipment items and the animal protection measures in the next section.

TRANSITION to Unit 4: Equipment Description