

## **TRANSMISSION LINE ROUTING EXERCISE**

### **Activity Descriptions**

1. "Classroom Exercise"
  - a. Each person in the class is given a card randomly. 75-80 percent of the students receive blank cards while 20 to 25 percent receive cards that state a land use feature they represent. The land uses include such things as swamp, scenic river, cemetery, barn, national park, old growth forest and NIMBY. A rope is given to a selected person at the front of the class. The rope represents the transmission line. Each foot of rope represents a mile of transmission line and costs \$500,000. After the students show their cards, they need to design a transmission route using as little of the rope as possible. The end of the rope is passed to an adjacent person based on selecting the best feature to accommodate the line. The final result is a transmission line route from the front of the class (Point A - generator) to the back (Point B - customer) defined by the rope. The length of rope can be measured and compared with the straight-line distance to the back of the class. The difference between the routed rope and the straight-line distance can be figured in feet and multiplied by \$500,000 to determine the extra cost incurred by the transmission line builder based on exclusions and avoidances.
  
2. "Map Exercise"
  - a. The students route a transmission line on a given map using shown start and end points and the following siting criteria.

### **Transmission Line Information**

1. Structure Type
  - a. The type of structure selected to hold up the wires depends on many things, including cost, line voltage, and land use. Samples of the different types of structures are shown on attached pictures.
  
2. Voltage
  - a. Transmission lines are used to transmit large amounts of power and energy to substations where the power can be distributed to users. To transmit large amounts of energy, the line voltage must also be high. Typical transmission line voltages are 115,000, 230,000, or 345,000 volts. In special cases, voltage can be even higher.
  
3. Right-of-Way Width
  - a. Space on either side of the transmission line must be maintained clear to prevent electrical arcing to objects that are grounded. Electrical arcing can cause fires or injury to animals or humans. In addition, arcing will disrupt electrical service. The right-of-way space is also used by line maintenance crews to inspect and make repairs to the line. Typical right-of-way widths are 125-200 feet. The transmission line is usually located in the center of the right-of-way.

## **Transmission Line Siting Criteria**

1. Exclusion Areas (must be completely avoided)
  - a. Parks, historic sites, landmarks, monuments, and wilderness areas.
  - b. Areas that are critical to threatened or endangered species.
2. Avoidance Areas (avoid unless there is no reasonable alternative)
  - a. Designated wildlife areas, scenic rivers, grasslands, game management, and forests.
  - b. Areas within 500 feet of a school, residence, or place of business.
  - c. Irrigated land.
3. Other Considerations
  - a. Minimize affect on regular agricultural or commercial activities.
  - b. Accommodate landowner requests when possible.
  - c. Follow local township and county zoning requirements.
  - d. Minimize overall cost of line (cost will affect rates paid by electricity users).