

ELECTRIC TRANSMISSION ISSUES - DISCUSSION

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The high voltage transmission system performs a number of functions and has distinct characteristics which are significantly different from the other energy transfer modes-i.e., rail, water transport and pipeline systems-being considered by the "DOE-DOT Joint Energy Sector Future Transportation Needs Study." These unique characteristics and functions include the following:

1. High voltage transmission lines operate as part of an electrical network and are, therefore, subject to physical laws applicable to electricity. The unique characteristics of electric energy transfers when compared to transportation of other energy commodities need to be clearly recognized in the study. These characteristics include: instantaneous generation, transmission and consumption of electric energy within the elements of the electrical network; the instantaneous effects of electrical faults (short circuits) on the network and the necessity for extremely rapid isolation and elimination of such faults; and the ability of the flow of power in a given line to change instantaneously its direction and/or magnitude, as system conditions dictate.

2. High voltage transmission lines interconnect adjacent utilities thus permitting exchange of electric power and energy between systems for economy and emergency support. These interconnections permit reductions in installed generating capacity and/or transmission facilities while maintaining the same overall reliability levels.

3. The higher-voltage lines (765 kV, 500 kV and 345 kV) operate in parallel with lower-voltage lines. If the higher-voltage lines were not used, additional lower-voltage transmission lines would be required to provide the necessary margins of system stability and reliability needed to withstand short-and long-duration faults, and facility outages.

4. A comparison of energy lost in transmission with that used in transportation shows: high voltage transmission lines use from .8% to 1.5% of the energy transmitter per 100 miles (160 km) depending upon the line loadings, unit trains from about .4% to .7% depending upon the grade of the rail line and operating conditions, pipelines about .5% and barges from .3% to .5%.