Applications of GIS in Electrical Power System

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OUTLINES:

• Objective
• Importance of GIS
• GIS data development
• Application of GIS
• Findings
• Conclusions and Recommendations
Objective:

• To show the possible applications of GIS in electrical power system
Importance of GIS to the Electrical utility:

- Accurate up-to-date information of the network assets.
- Improving system visualization by associating spatial data with the network elements.
- Connects database information such as billing, material account, distribution analysis and outage reporting in power utility.
- allows the simultaneous assessment of technical, financial, and environmental factors.
GIS Database Development:

(1) Digitization Process:
- GPS survey of electrical consumers and network assets.
- Digitization of electrical network assets.
- GIS mapping, indexing of electrical consumers and network assets

(2) Data Collection:
- GPS Base Station & adequate number of GPS Receivers.
- Surveyors walk along and capture the spatial position.
- Collect attribute data.
- The digital base map must show the important landmarks For better visualization.
Application of GIS in Electrical Power System:

(1) GIS Integration:

- Integrates the spatial data with various utility applications (customer information, assets management, outage management and billing System).

- The GIS must display now the particular network element and their attributes (from the consumer to the utility).
Application of GIS in Electrical Power System:

(2) Optimizing Electrical Lines Routing:
• Installing transmission lines is very expensive.
• Straight route with minimum curves is desirable.
• Parameters should be considered.
  Population around the area
  Environment (soils/trees/geologic features)
• GIS used to analyze the areas for transmission lines with minimal environmental disruption, no health risks
Application of GIS in Electrical Power System:

(3) Load Forecasting:

• Predicting the amount of future load growth and the location of load increment.

• Very important for power planning.

• GIS technology merge distribution system data with current land use data, transportation infrastructure, and urban centers data.
Application of GIS in Electrical Power System:

(4) Disaster Management and Locating Faults:
- GIS relates transmission network conditions with other relevant information such as weather, vegetation growth, and road networks.
- Identification of a weather moving towards an area enables to determine transmission facilities in risks.
- Necessary actions will be taken after determine the location of contingency (emergency).
Findings:

(1) To utilize GIS in power system, power system data (load flow, network assets, customers' information, billing system, etc.) must be integrated with GIS.

(2) Planning transmission lines and disaster management are affected by residential and environmental conditions, so GIS plays significant role in study and analyze these factors.

(3) GIS very useful in electrical power system, when we connect the information that we have with the maps, we get better visualization.
Conclusions:

Application of GIS can be conclude as:

(1) Integrating between system data and GIS can be used for Energy Audit, Load Management, Network Planning and analysis

(2) Determining the optimum, shortest, and most economic path for transmission lines

(3) Forecasting and predicting the amount of power needed in the future.

(4) Locating the faults and prevents the disasters
Recommendations:

(1) Train some of the electrical engineers in the power utility on the use of GIS, since it has been very useful and has several applications.

(2) GIS and GPS can get more involved in more application in electrical system in future, like real-time wide area measurements using GPS as a trigger.
THANK YOU