LEGISLATIVE RESEARCH COMMISSION

PROGRAM REVIEW AND INVESTIGATIONS COMMITTEE

Siting of Electric Transmission Lines

Research Report No. 348

Prepared by

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Siting of Electric Transmission Lines

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Foreword

The authors of this report appreciate the cooperation of the commissioners of the Kentucky Public Service Commission: Chairman Mark David Goss, Vice Chairman John W. Clay, and Commissioner Caroline Pitt Clark. David S. Samford and many other Public Service Commission staff were very helpful. A.W. Turner took the time to meet with Program Review staff even after leaving the Public Service Commission's employ.

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Staff thank attorneys Robert W. Griffith, Jennifer Swyers, and Tom Fitzgerald for taking time to discuss the siting process, especially its provisions for public participation. Finally, the cooperation of Carroll and Doris Tichenor in providing a detailed description of their experience as intervenors in a siting case is appreciated.

Robert Sherman
Director

Legislative Research Commission
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Overview and Background

This report covers issues related to the siting of transmission lines. Transmission lines carry electric power at high voltages, often over long distances, from generating plants to local substations. Distribution lines, which are more common, are mid-voltage lines that carry power from substations to where it will be used.

Demand for electricity continues to grow. Electricity sales in Kentucky have increased almost every year since 1990. Total sales by the entire electric industry increased 46 percent from 1990 to 2005. Sales for residential use are up 60 percent over this time period.

Kentucky has 28 certified service areas, each with its own supplier of electricity. Four areas are served by investor-owned utilities that are regulated by the Kentucky Public Service Commission (PSC). Nineteen areas are served by rural electric utilities that are regulated by PSC. Five rural electric cooperatives purchase power from the Tennessee Valley Authority.

Six utilities that are regulated by PSC generate and transmit electricity in Kentucky: Big Rivers Electric Corporation, Duke Energy, East Kentucky Power Cooperative, Kentucky Power Company, Kentucky Utilities, and Louisville Gas and Electric. The Tennessee Valley Authority also generates and transmits electricity in Kentucky. These seven systems make up Kentucky's 13,000-mile electric transmission grid. The lines on which Kentucky's generating utilities transmit the electricity they produce to the retail electric utilities are part of the Eastern Interconnect grid.

Utilities have traditionally favored overhead lines, and there are few underground transmission lines. Most underground systems have few towers, poles, or lines to see. Principal among the disadvantages of underground lines is that they are significantly more expensive than overhead lines. Underground lines are at least as reliable as overhead lines and, depending on the type of line used, may have significantly fewer interruptions. Almost all studies indicate that the time to repair lines is significantly longer for underground transmission lines than for overhead lines.

Electromagnetic fields (EMF) are invisible lines of force that surround all electrical devices, including transmission lines. Some studies have reported an increased risk for some types of leukemia associated with exposure to magnetic fields. According to a 1999 report from the U.S. National Institute of Environmental Health Sciences, scientific evidence that EMF "exposures pose any health risk is weak." The authors of the report concluded that "EMF exposure cannot be recognized as entirely safe" but that "aggressive regulatory concern" was not warranted. The report's authors did suggest that power lines be sited to reduce exposure to EMF. At least six states have standards for maximum electric fields in the rights-of-way or at the edge of rights-of-way of transmission lines. At least four states have standards for magnetic fields at the edges of rights-of-way.

Kentucky's Certification Processes for Electric Transmission Lines

Prior to 2004, transmission owners usually did not need PSC's approval before undertaking transmission line projects. Senate Bill 246, enacted in 2004, requires PSC-regulated entities to apply for and be granted a Certificate of Public Convenience and Necessity (CPCN) before beginning construction on electric transmission lines of at least 138 kilovolts and at least 1 mile in length. The law provided for a forum in which individuals affected by the proposed construction can play an active role in the CPCN process. Individuals can request that PSC hold a public hearing in the county where construction is proposed. If an individual wishes to play a more formal role, he or she can request to "intervene," which grants the person full rights of a party to the case.

An entity that intends to construct an electric transmission line that requires PSC approval must submit a notice of intent to file an application with PSC 30 days to 6 months prior to filing a CPCN application. The applicant must also publish a public notice of the proposed line in a local newspaper of general circulation in the county or counties in which the line will be located. Notification must be made in writing to each landowner over whose property the proposed line will pass.

A person requesting a public hearing must submit a written request to PSC within 30 days of the application being judged administratively complete. Local public hearings are informal proceedings that give the public an opportunity to be heard by PSC and are held in the county where the project would be located. The number of people who have attended hearings varied widely among projects in recent years. Some hearings had only one person. In at least two cases, well over 100 people attended the local hearings.

A person interested in participating in a PSC evidentiary hearing must request in writing to intervene in the case within 30 days of the CPCN application being judged administratively complete. Evidentiary hearings are formal proceedings, with sworn testimony limited to the applicants and the parties to the case, which include intervenors.

The Kentucky State Board on Electric Generation and Transmission Siting (known as the Siting Board) is responsible for reviewing all certificate applications from transmission owners not regulated by PSC for the construction of electric transmission lines that are capable of carrying 69 kilovolts or more. Anyone who intends to construct such a transmission line must file a notice of intent to file with the Siting Board 30 days before submitting its certificate application. The Siting Board contacts the governor and the county and city governments where the proposed facility would be located. During the 30-day notice period, the applicant must publish a construction notice in a local newspaper of general circulation.

The Siting Board will schedule a local public hearing if it has received a written request from any local governmental entities or from at least three county residents within 30 days of the filing of a complete certificate application.

Any party to the case wishing to have a formal evidentiary hearing must submit a written request to the Siting Board within 30 days of a complete application being filed. An eligible person

interested in becoming a party to the case must submit a written request to the Siting Board within 30 days of the application being judged administratively complete.

The Public Service Commission must issue its decision no later than 90 days after the application is filed unless the commission extends this period for good cause to 120 days. The Siting Board is required to make its decision no later than 120 days after the submission of a complete application.

PSC commissioners, staff, and past employees all identified the 120-day review period as a critical problem. Such a time frame can put PSC and the Siting Board in a bind if necessary outside consultants have scheduling conflicts with other projects when they are called on to evaluate transmission line cases. PSC commissioners told staff that an additional 60 to 90 days beyond the current 120-day schedule would be their preferred time limit for making decisions. Intervenors in past cases and their attorneys indicated in their submissions to PSC or in interviews with Program Review staff that the 120-day limit can be too short for them to build effective cases.

Most utility representatives said that 120 days was sufficient time for the Siting Board and PSC to make well-informed decisions. For utility companies, the 120-day review period represents a 4-month hiatus in the middle of a transmission line project after routing is nearly completed but before construction begins. In some cases, minimal delays in the certificate process can force a utility to delay a project for up to a year because of issues related to environmental compliance.

Because the Tennessee Valley Authority is a federal agency, its transmission lines are not subject to approval by PSC or the Siting Board.

Any transmission owner that uses federally guaranteed loans, which are usually administered through the Rural Utilities Service, must comply with the National Environmental Policy Act (NEPA) before those funds are released. This law requires that prior to taking any major action, the acting party must consider the environmental impact of that action. The NEPA process and Kentucky's CPCN process each requires that the applicant develop a centerline for the route of the proposed transmission line. There is no guarantee that a centerline approved under one process will be approved by the other. Some NEPA compliance issues may require transmission owners to mitigate the effects of a specific project by adjusting a transmission centerline to avoid or minimize potential impact to a cultural resource. Recent PSC orders, however, have required that approved transmission centerlines cannot be adjusted by more than 500 feet on either side of the centerline and then only by written agreement with the property owner.

How the Public Service Commission Decides Electric Transmission Line Cases

Prior to 1992, applying for a CPCN for electric transmission lines was somewhat informal. In 1992, the *Duerson v. East Kentucky Power Cooperative, Inc.* case held that construction of new electric transmission lines were extensions in the usual course of business. As of 2004, utilities must go through a formal, rigorous process to obtain a CPCN.

Following the 2004 amendments to KRS 278.020, some controversy surrounded PSC's initial interpretation of what factors to consider when deciding whether to grant a CPCN. Of particular importance was how to interpret the controlling court case, *Kentucky Utilities Company v. Public Service Commission*, which sets out the two basic elements for granting a CPCN: need and absence of wasteful duplication of facilities. The need element was essentially uncontested, but there was a great deal of discussion about how to interpret the element of absence of wasteful duplication. Initially, PSC denied some CPCN applications because the applicants had failed to demonstrate that their proposed lines did not involve wasteful duplication. Gradually, PSC and the applicants reached clarification on the process for demonstrating this element.

Before 2004, the least-cost method was most often used to choose a route. PSC now emphasizes rebuilding existing lines and colocating new lines with existing routes, even if it costs somewhat more. Applicants must show that they considered using existing utility corridors and rights-of-way. However, there is no minimum level of colocation that must be used in siting a new line. PSC weighs the cost against reliability and impacts on landowners.

Siting Methods for Electric Transmission Lines

Typically, the siting of a transmission line starts with a design team plotting the beginning and ending points of the proposed line on topographic maps and then connecting those points with a straight line. The team then adjusts the line around features that might cause lengthy permitting delays. The team develops several routes, checks them by doing field work, and picks the consensus best route. Affected property owners are identified and invited to attend a public meeting about the route. Partly in response to criticisms that this is a closed process, the industry has developed computer-based models that systematically identify transmission routes that have the least impact on surrounding landscapes and that result in more logical and defensible siting decisions.

The method developed by the Electric Power Research Institute (EPRI) and Georgia Transmission Corporation (GTC) is the best known of these new systems. The method begins by identifying a large area of the landscape that contains land parcels that are most suitable for the construction of a proposed transmission line based on set criteria. Increasingly detailed information is added about each land parcel as the method moves through successive stages and as more and more refined routes are identified. The process ends with the identification of specific routes. Transmission applicants' siting specialists use their judgment to choose from among the routes that are highest rated using the method.

Phase 1 of the EPRI-GTC method generates a digital map representing a relatively large geographical area called a macro corridor that contains the most suitable land for routing an overhead transmission line between two known points. Geographic Information System technology aids in identifying this area by analyzing satellite imagery and other available digital data to find corridors that minimize adverse impacts to the built and natural environments. In Phase 2 of the method, four alternative corridors within the macro corridor are created. Each alternative seeks to minimize impacts to specific aspects of the surrounding landscape and each takes a slightly different perspective. These are the built environment perspective, which protects

people, places, and cultural resources; the natural environment perspective, which protects water resources, plants, and animals; the engineering requirement perspective, which minimizes costs and schedule delays; and the simple combined perspective, which is a composite of the built, natural, and engineering perspectives. In Phase 3, Geographic Information System modeling is used to facilitate discussion among electric transmission experts as they select a preferred route and alternative routes.

East Kentucky Power Cooperative and E.ON U.S. sponsored a workshop in February 2006 to adapt the EPRI-GTC method for use in Kentucky. The result is what is referred to as the Kentucky Transmission Line Siting Model. The workshop included local utility companies, Geographic Information System specialists, several team members who developed the original EPRI-GTC method, and other stakeholders. By the end of the workshop, participants had developed a list of variables they felt were significant to consider when siting a proposed transmission line. The list was similar to that used in the original EPRI-GTC method. Differences included the removal of variables from the EPRI-GTC list that were not applicable in Kentucky, such as pecan orchards, and the addition of variables that were Kentucky specific, such as horse farms.

Recommendations

4.1 The Public Service Commission should make available as a document and on its Web site a primer on the workings of the Kentucky Transmission Line Siting Model.

4.2 The Public Service Commission should work with Kentucky utility companies and others to ensure that the Kentucky Transmission Line Siting Model is updated periodically based on input from diverse interested parties.

4.3 The Public Service Commission should consider hiring a consultant to verify that data used in the Kentucky Transmission Line Siting Model are accurate and to create a plan to address any deficiencies found.

Chapter 1

Overview and Background

Introduction

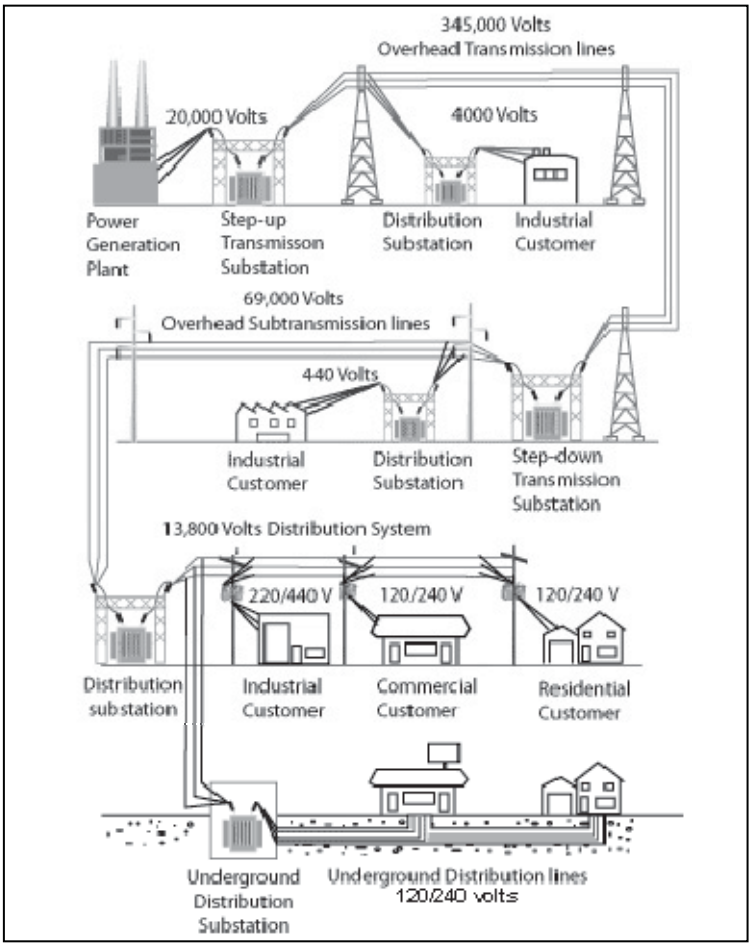
Transmission lines carry electric power at high voltages, often over long distances, from generating plants to local substations. Distribution lines, which are more common, are mid-voltage lines that carry power from substations to where it will be used. This report only covers issues related to siting of transmission lines.

This report covers issues related to the siting of transmission lines, not distribution lines. Most commonly seen power lines are distribution lines, which typically run along roads or streets. These mid-voltage lines carry power from electrical substations for use in places such as homes, schools, and businesses. Typically, the structures used to support distribution lines are approximately 40 feet tall. Transmission lines, which are larger, carry electricity long distances from generating plants to substations. The supporting structures for transmission lines are 60 to 140 feet tall and can require rights-of-way of well over 100 feet wide.

Figure 1.A provides a simplified overview of transmission and distribution of electric power. Transmission lines carry electric power at high voltages, which minimizes losses, from generating plants to local substations. Substations convert the power to lower voltages. Some industrial customers may be connected directly to a substation. For other customers, transformer boxes reduce the voltage to levels usable by them.[1] Transmission lines are shown as being overhead lines, which is almost always the case.

[1] The figure shows the capacity of transmission lines and some distribution lines in thousands of volts. More commonly, these would be measured in kilovolts (1,000 volts). A 345 kilovolt line is the same as a 345,000 volt line. Some of the voltages shown in the figure are illustrative. Not all transmission lines use the voltages shown.

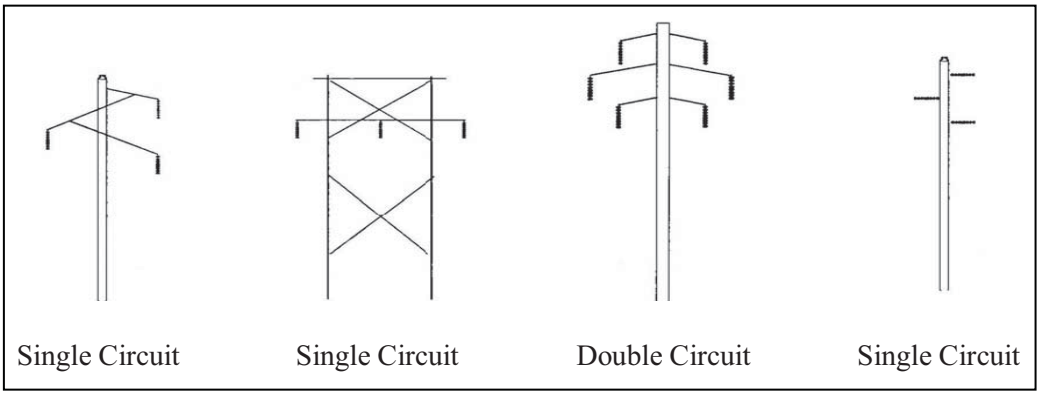
Figure 1.A
Transmission and Distribution of Electric Power



Source: U.S. Dept. of Labor.

Transmission structures are constructed of wood or metal. They can consist of one or two poles or can be towers. A circuit is made up of three lines. Larger structures can carry more than one circuit. Figure 1.B shows examples of structures used to carry transmission lines.

Figure 1.B
Examples of Transmission Line Structures



Source: State of Wisconsin 4.

Description of This Study

How This Study Was Conducted

On August 10, 2006, the Program Review and Investigations Committee voted to have staff study the siting of electric transmission lines in Kentucky. To complete this study, staff analyzed relevant reports and documents, including data from past and present cases before the Public Service Commission (PSC) and the Kentucky State Board on Electric Generation and Transmission Siting. Staff also conducted Internet and periodical searches.

Staff interviewed utility officials, PSC staff and commissioners, intervenors in previous cases, staff of private consulting firms, and academic professionals. Staff sent questionnaires to all utilities that had applied for transmission line certificates within the past 3 years. Staff attended a local open house hosted by a utility company, a local public hearing, and a PSC evidentiary hearing.

Organization of the Report

This report has four chapters. The report's three recommendations are at the end of Chapter 4. The remainder of Chapter 1 provides an overview of Kentucky's electricity transmission infrastructure, the Kentucky agencies that must approve the construction of new transmission lines, how other states regulate siting, underground siting of transmission lines, and relevant major health issues.

Chapter 2 discusses the siting procedures established in statute and regulation for the Public Service Commission and the State Board on Electric Generation and Transmission Siting.

This report has five major conclusions.
1. In 2004, the General Assembly changed the approval process for siting electric transmission lines significantly, so there has been a limited number of transmission line cases under the new law to evaluate.
2. In deciding electric transmission siting cases since 2004, the Public Service Commission (PSC) has gradually clarified its criteria for whether proposed lines should be approved.
3. Since 2004, PSC has emphasized thoroughly considering rebuilding existing lines and relocation along existing routes. There is a standard of reasonableness for any additional costs, so there are no minimum required levels of rebuilding or colocation.
4. By statute, there is a 120-day time limit to decide electric transmission line cases. Commissioners and staff of PSC and some members of the public who have intervened in transmission cases favor increasing the time limit. Representatives of utility companies have said that 120 days is sufficient and that lengthening the time period could result in costly delays.
5. A systematic Kentucky Transmission Line Siting Model has been developed and is being used by transmission companies to help choose line routes. Assuming the data on which it is based are accurate, the model has great potential to make siting of routes more consistent with criteria developed by a diverse group of interested parties.

Chapter 3 summarizes the transmission cases decided by the Public Service Commission since 2004 to indicate how the commission has clarified its decision-making criteria over time.

Chapter 4 covers the methods used for deciding where a proposed transmission line should go. A method developed by the Electric Power Research Institute and Georgia Transmission Corporation is discussed in detail because of its potential for significantly changing how lines are sited. A version adapted for Kentucky is already in use.

Appendix A provides summary information for cases heard by PSC and the State Board on Electric Generation and Transmission Siting since 2004. Appendix B contains sample information sent by a transmission line applicant to landowners affected by a proposed line. Appendix C is East Kentucky Power Cooperative's response to this report.

Major Conclusions

This report has five major conclusions.

1. In 2004, the General Assembly changed the approval process for siting electric transmission lines significantly, so there have been a limited number of transmission line cases under the new law to evaluate.

2. In deciding electric transmission siting cases since 2004, the Public Service Commission has gradually clarified its criteria for whether proposed lines should be approved.

3. Since 2004, the Public Service Commission has emphasized thoroughly considering rebuilding existing lines and relocation along existing routes. There is a standard of reasonableness for any additional costs, so there are no minimum required levels of rebuilding or colocation.

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5. A systematic Kentucky Transmission Line Siting Model has been developed and is being used by transmission companies to help choose line routes. Assuming the data on which it is based are accurate, the model has great potential to make siting of routes more consistent with criteria developed by a diverse group of interested parties.

Kentucky's Electricity Infrastructure

Kentucky has 28 certified service areas, each with its own supplier of electricity. Four areas are served by investor-owned utilities that are regulated by the Kentucky Public Service Commission. Nineteen areas are served by rural electric utilities that are regulated by PSC. Five rural electric cooperatives purchase power from the Tennessee Valley Authority (TVA). All 28 utilities maintain the distribution lines used to serve customers in their areas, but most do not generate the electricity they provide.

Since 1972, Kentucky has been divided into regions known as certified service areas. By allowing only one retail electric supplier to serve each area, the General Assembly hoped to encourage the systematic development of retail electric service and to avoid wasteful duplication of facilities (KRS 278.016 to KRS 278.018).

As shown in Table 1.1, Kentucky has 28 certified service areas, each with its own supplier of electricity.[2] Four areas are each served by investor-owned utilities that are regulated by PSC. Nineteen areas are served by rural electric utilities that also are regulated by PSC. Five rural electric cooperatives purchase power from the Tennessee Valley Authority (TVA) and are not regulated by PSC. All 28 utilities maintain the distribution lines used to serve customers in their areas, but most do not generate the electricity they provide.

Six utilities that are regulated by PSC generate and transmit electricity in Kentucky: Big Rivers Cooperative Corporation, Duke Energy Corporation, East Kentucky Power Cooperative, Kentucky Power Company, Kentucky Utilities Company, and Louisville Gas and Electric Company. The Tennessee Valley Authority, which is not regulated by PSC, also generates and transmits electricity in Kentucky. These seven systems make up Kentucky's 13,000-mile electric transmission grid. The lines on which Kentucky's generating utilities transmit the electricity they produce to the retail electric utilities are part of the Eastern Interconnect grid.

Six utilities that are regulated by PSC generate and transmit electricity in Kentucky. The four investor-owned generation and transmission utilities are Duke Energy Corporation, Kentucky Power Company, which is a subsidiary of American Electric Power; and Kentucky Utilities Company and Louisville Gas and Electric Company, which are both subsidiaries of E.ON U.S. The two generating and transmission cooperatives are Big Rivers Electric Corporation and East Kentucky Power Cooperative. Together, all the above entities serve approximately 1.8 million customers in Kentucky.

Thirty municipal electric systems and five TVA-supplied distribution cooperatives, which are not under the jurisdiction of PSC, serve approximately 375,000 electricity customers statewide.

[2] In two small areas, there are multiple service providers. One area is served by Jackson Energy Cooperative and Kentucky Utilities. The other is served by Meade County Rural Electric Cooperative Corporation and Louisville Gas and Electric.

Table 1.1
Utility Companies Serving Kentucky

Investor-owned Utilities Regulated by PSC
Duke Energy Kentucky
Kentucky Power Company
Kentucky Utilities Company
Louisville Gas and Electric Company
Rural Electric Utilities Regulated by PSC
Big Sandy RECC
Blue Grass Energy Cooperative
Clark Energy Cooperative
Cumberland Valley Electric
Farmers RECC
Fleming-Mason Energy Cooperative
Grayson RECC
Inter-County Energy Cooperative
Jackson Energy Cooperative
Jackson Purchase Energy Corporation
Kenergy Corporation
Licking Valley RECC
Meade County RECC
Nolin RECC
Owen Electric Cooperative
Salt River Electric Cooperative
Shelby Energy Cooperative
South Kentucky RECC
Taylor County RECC
Rural Electric Utilities Regulated by Tennessee Valley Authority
Hickman-Fulton Counties RECC
Pennyrile RECC
Tri-County Rural Electric Membership Cooperative
Warren RECC
TVA West Kentucky RECC
30 Municipal Utilities

Note: RECC is Rural Electric Cooperative Corporation.
Source: Commonwealth of Kentucky. Public. "Electric."

The lines on which Kentucky's generating utilities transmit the electricity they produce to retail electric utilities is part of the Eastern Interconnect grid, which covers much of the area from the foothills of the Rocky Mountains and central Canada to the Atlantic coast. All the electric utilities within this area are tied together during normal system conditions.

Within Kentucky, the electric transmission grid consists of more than 13,000 miles of electric transmission line in seven individual systems. Table 1.2 indicates the miles of transmission line for each system. Each system was created to transfer power from its own generators to its own customers. Through the years, the systems have become increasingly interconnected for mutual reliability and load diversity and to reduce the occurrence of redundant facilities. These seven transmission systems are regulated by PSC, the Kentucky State Board on Electric Generation and Siting, or TVA.

Table 1.2
Transmission Line Miles Per System

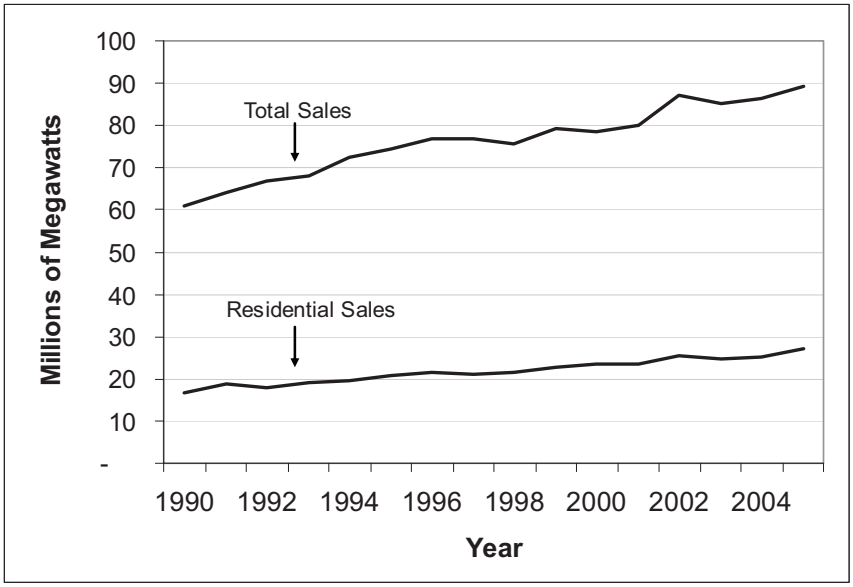
Voltage (kilovolts)	System						Total
	Big Rivers	Duke Energy	East Kentucky Power	E.ON	Kentucky Power	Tennessee Valley Authority	
69	791	126	1,864	2,581	417	432	6,280
138	15	104	388	1,172	299	0	2,116
161	341	0	333	55	46	1008	1,944
345	68	61	60	482	9	0	1,025
500	0	0	0	36	0	85	621
765	0	0	0	0	258	0	1,023
Total	1,215	291	2,645	4,326	1,029	1,525	13,009

Source: Commonwealth of Kentucky. Public. *Kentucky's* 35.

Electricity Sales in Kentucky Have Steadily Increased

Kentuckians' demand for electricity continues to grow, which increases the demand for transmission capacity. As indicated in Figure 1.C, electricity sales in Kentucky have gone up almost every year since 1990. Total sales by the entire electric industry increased 46 percent from 1990 to 2005. Sales for residential use were up 60 percent over this period.

Figure 1.C
Total and Residential Sales in Megawatts for Kentucky's Electric Industry (1990 to 2005)



Source: U.S. Dept. of Energy.

Kentucky's Regulatory Agencies

Any PSC-regulated entity wishing to construct a transmission line of at least 138 kilovolts and of at least 1 mile in length for the purpose of serving the public must first acquire a Certificate of Public Convenience and Necessity from PSC. Any entity not regulated by PSC or TVA that wants to build a transmission line of at least 69 kilovolts must obtain a certificate from the Kentucky State Board on Electric Generation and Transmission Siting.

Any PSC-regulated entity wishing to construct a transmission line of at least 138 kilovolts and of at least 1 mile in length for the purpose of serving the public must first acquire a Certificate of Public Convenience and Necessity from PSC. Any entity not regulated by PSC or TVA that wants to build a transmission line of at least 69 kilovolts must obtain a certificate from the Kentucky State Board on Electric Generation and Transmission Siting (known as the Siting Board). Because the Tennessee Valley Authority is a federal agency, its transmission lines are not subject to approval by PSC or the Siting Board.

Public Service Commission

Created by the General Assembly in 1934, the Kentucky Public Service Commission is a three-member administrative body with quasi-legislative and quasi-judicial power. The governor appoints members to 4-year staggered terms. One member is appointed to act as chair and another as vice chair. The commission appoints an executive director who is responsible for daily operations.

The three members of the Public Service Commission are appointed by the governor for 4-year staggered terms. The Siting Board has five permanent members. Two ad hoc members are appointed by the governor to review each specific case.

PSC's mission is to ensure reliable service at a reasonable price to customers of the utilities it regulates, while providing financial stability to regulated utilities by setting fair rates and supporting their operations by overseeing regulated activities. Such regulatory functions are served by issuing written orders as outlined in KRS Chapter 278 and KAR Title 807.

PSC regulates the intrastate rates and services of investor-owned electric, natural gas, telephone, water, and sewage utilities; and customer-owned electric cooperatives, telephone cooperatives, water districts, water associations, and certain aspects of gas pipelines. PSC processes approximately 550 cases per year.

Kentucky State Board on Electric Generation and Transmission Siting

The General Assembly created the seven-member Kentucky State Board on Electric Generation and Transmission Siting (known as the Siting Board) in 2002 to review certificate applications for certain facilities that are not regulated by PSC. The five permanent members of the board are the three members of PSC, the secretary of the Environmental and Public Protection Cabinet or the secretary's designee, and the secretary of the Cabinet for Economic Development or the secretary's designee. Two ad hoc members are appointed by the governor to review each specific case. PSC provides support staff to the board.

The Siting Board reviews certificate applications for the construction of merchant power plants, which sell power on the wholesale market, with a generating capacity of 10 megawatts or more and transmission lines capable of carrying 69 kilovolts or more that are not regulated by PSC.

The Siting Board reviews certificate applications for the construction of merchant power plants, which sell power on the wholesale market, with a generating capacity of 10 megawatts or more, and transmission lines capable of carrying 69 kilovolts or more that are not regulated by PSC. Their review focuses on environmental matters that are not covered by permits issued by the Kentucky Department of Environmental Protection, such as noise and visual impacts; economic matters; and the impact of the proposed facility on Kentucky's electric transmission grid. The Siting Board's decision to grant or deny a construction certificate is served through issuance of a written order following adjudicative and rulemaking procedures outlined in KRS Chapter 278 and KAR Title 207.

Tennessee Valley Authority

The Tennessee Valley Authority is a federal corporation established in 1933 to reduce the risk of flood damage, to provide electric power, and to promote agricultural and industrial development in the Tennessee River valley. It is the nation's largest public power company, providing wholesale power to 158 municipal and cooperative power distributors.

TVA is a federal agency, so PSC and the Siting Board do not regulate construction of its new transmission lines. Typically, TVA identifies alternative routes for a new transmission line and notifies property owners along the routes by mail that there will be an open house and comment period for input. TVA accepts comments for 30 days after the open house. Once a preferred route is identified, detailed environmental review may result in minor changes to the route (Tennessee).

Regulation in Kentucky and Other States

Whether Siting of Transmission Lines Must Be Approved

Kentucky appears typical of how states regulate whether the siting of electric transmission lines must be approved. Only a handful of states either regulate all lines or do not regulate any lines. In 31 states, including Kentucky, there is a minimum voltage requirement for state approval of transmission construction to be mandated.

As shown in Table 1.2, Kentucky appears typical of how states regulate whether the siting of electric transmission lines must be approved. Only a handful of states either regulate all lines or do not regulate any lines. In 31 states, including Kentucky, there is a minimum voltage requirement for state approval of transmission construction to be mandated. Kentucky is among 14 states in which there is a minimum line length for state approval of siting to be required.

Table 1.3
State Regulation of Siting of Electric Transmission Lines

State	All Lines Regulated	No Direct State Oversight	Approval Needed Based on				
			Length	Other	Minimum Voltage (in kilovolts)		
					69 or less	70 to 138	More Than 138
Alabama		■		■			
Alaska	■						
Arizona						■	
Arkansas	■		■				
California				■			
Colorado	■						
Connecticut						■	
Delaware				■			
District of Columbia	■						
Florida			■	■	■		■
Georgia		■					
Hawaii	■			■			
Idaho				■			
Illinois				■			
Indiana		■					
Iowa				■	■		
Kansas			■	■			■
Kentucky			■			■	
Louisiana		■					
Maine						■	
Maryland						■	
Massachusetts			■	■	■	■	
Michigan			■				■
Minnesota			■	■		■	■
Mississippi				■			
Missouri				■			
Montana					■		
Nebraska					■		
Nevada							■
New Hampshire			■	■		■	
New Jersey				■			■
New Mexico				■			
New York			■	■		■	
North Carolina							■
North Dakota						■	
Ohio						■	
Oklahoma		■					
Oregon			■	■			■
Pennsylvania			■			■	

Continued on next page.

State	All Lines Regulated	No Direct State Oversight	Approval Needed Based on				
			Length	Other	Minimum Voltage (in kilovolts)		
					69 or less	70 to 138	More Than 138
Rhode Island							■
South Carolina						■	
South Dakota			■	■		■	■
Tennessee				■			
Texas					■		
Utah				■			
Vermont					■		
Virginia				■			■
Washington				■			
West Virginia				■			■
Wisconsin			■	■		■	
Wyoming			■	■	■		
Number of States	5	5	14	26	Any voltage requirement: 31 states		

Source: Compiled by Program Review staff from Edison Electric Institute's *State Generation & Transmission Siting Directory*.

Criteria for Approving Proposed Transmission Lines

Kentucky's criteria for granting a Certificate of Public Convenience and Necessity for new electric transmission lines derive from the interpretation of the meaning of "public convenience and necessity" in KRS 278.020. A case decided in 1952 by the Court of Appeals established two elements that must be met by an applicant seeking to construct a new line: 1) need and 2) an absence of wasteful duplication of facilities.

Kentucky's criteria for granting a Certificate of Public Convenience and Necessity (CPCN) for new electric transmission lines derive from the interpretation of the meaning of "public convenience and necessity" in KRS 278.020. This interpretation was handed down in 1952 by the Court of Appeals of Kentucky, at that time Kentucky's highest court, in *Kentucky Utilities Company v. Public Service Commission*. That case established two elements that must be met by an applicant seeking to construct a new line: 1) need and 2) an absence of wasteful duplication of facilities.

The first element has been mostly uncontested. The second element has been the subject of much discussion since the 2004 amendments to the statute, resulting in clarification through Public Service Commission cases. PSC has said that to demonstrate an absence of wasteful duplication, an applicant must establish that it has conducted a thorough review of all reasonable alternative routes and that its choice of the proposed route was reasonable (PSC Case No. 2005-00207, Oct. 31, 2005). To establish these two elements, an applicant must show that it comprehensively considered the use of existing utility corridors and other rights-of-way (PSC Case No. 2005-00089, Aug. 19, 2005).

Some surrounding states differ from Kentucky in that statutes provide more detailed criteria that are to be used by the governing authority in transmission cases. Criteria include impacts on scenery, historic districts, the environment, and agricultural land.

Some surrounding states differ from Kentucky in that statutes provide more detailed criteria that are to be used by the governing authority in transmission cases. In Virginia, statutory criteria include whether the line's route will "reasonably minimize adverse impact on the scenic assets, historic districts and environment of the area concerned" (Code of Virginia § 56.46.1.B). In West Virginia, criteria include "an acceptable balance between reasonable power needs and reasonable environmental factors" (West Virginia Code §24-2-11 A(d)(2)). In Ohio, criteria include the probable environmental impact, whether "the line is consistent with regional plans for expansion of the electric power grid," and the facility's impact on the viability of agricultural land" (State of Ohio 4-5).

Consideration of Interstate Benefits

In 2006, the General Assembly amended KRS Chapter 278 to allow PSC and the Siting Board to consider the interstate benefits of proposed transmission lines. Based on interviews with PSC staff, this amendment was in response to provisions of the U.S. Energy Policy Act of 2005. According to the Act, the Department of Energy may designate any geographic area experiencing transmission capacity constraints or congestion that adversely affects consumers as a "national interest electric transmission corridor." The Act authorizes the Federal Energy Regulatory Commission as the siting authority for transmission facilities for a state in a designated corridor that lacks authority to approve siting of facilities and that lacks authority to consider the expected interstate benefits. Kentucky is not part of a designated corridor, but the 2006 legislation preserves Kentucky's siting authority if it were so designated.

Two Other Issues Related to Siting of Transmission Lines

The remainder of this chapter covers two issues related to siting of transmission lines. First, Program Review staff were asked to consider underground transmission lines as part of this study. There is relatively little existing or planned underground transmission line in Kentucky or the U.S., so this section serves as a brief overview of the subject. Second, the issue of the potential effects on health of electromagnetic forces of transmission lines has been raised in cases before PSC and in other states. This section provides a brief overview of that subject, too.

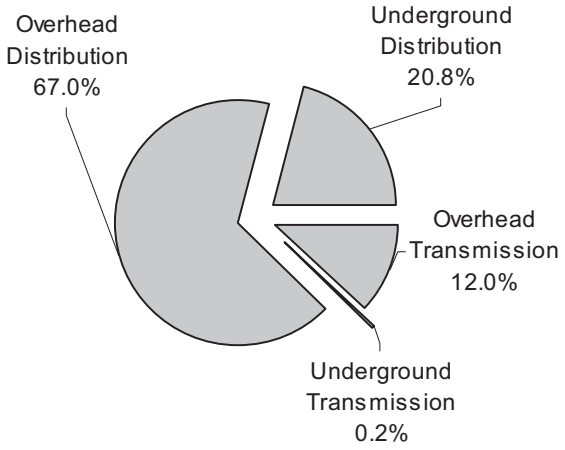
Underground Transmission Lines

Utilities have traditionally favored overhead transmission lines, and there is little underground transmission line in place. Most of the system is underground, so there are few towers, poles, or lines to see. Among the disadvantages of underground lines is that they are significantly more expensive than overhead lines.

Utilities have traditionally favored overhead transmission lines, and almost all transmission line mileage is overhead. As shown in Figure 1.D, underground transmission line was less than 1 percent of electric line mileage in the United States in 2001. In Kentucky, Louisville Gas and Electric has 5.89 miles of underground transmission, with 1.2 more miles planned. Kentucky Utilities has 2.4 miles of underground transmission, with 1.2 more miles planned. These underground lines are mostly located in the urban areas of Louisville and Lexington (Staton).

Underground transmission systems are sometimes favored by landowners whose land is to be used for transmission lines and by other members of the public. Most of the system is underground, so there are few towers, poles, or lines to see. Depending on the type and placement of an underground transmission line, there may be less public exposure to electromagnetic forces. Among the disadvantages of underground lines is that they are significantly more expensive than overhead lines.

Figure 1.D
Percentage of Distribution and Transmission Line Mileage in the U.S. Per Type of Line (2001)



Source: Johnson 4.

Situations in which underground lines are more likely to be seriously considered include when lines are located in densely populated areas, in areas with limited right-of-way, in areas where overhead lines are considered visually unacceptable, near airports, and for river crossings.

Situations in which underground lines are more likely to be seriously considered include when lines are located in densely populated areas where it would be difficult to run transmission lines along streets, in areas with limited right-of-way, in areas where overhead lines are considered visually unacceptable, near airports, and for river crossings (Commonwealth of Virginia 21-22).

Types and Construction of Underground Lines. There are several types of underground transmission systems, but two are most common. Either type would usually be installed 3 to 6 feet underground (Wise 4). High-pressure, fluid-filled systems (HPFF) have been used for decades. HPFF is especially common at higher voltage levels and comprises an estimated 80 percent of underground mileage. In an HPFF system, a steel pipe contains three conductors, which are surrounded by oil that does not conduct electricity. HPFF systems in the United States have been reliable (Commonwealth of Virginia 24-25). Disadvantages of HPFF include the need to pump a lot of fluid through the system, higher maintenance costs, and the risk of an oil leak or fire (Wise 4).

The extruded dielectric cable (XLPE) system consists of three cables in a concrete duct or buried in separate trenches. Each cable is insulated with a solid, plastic-like material so there is no need for a liquid insulator. There is little XLPE line installed, but its use is increasing (Wise 4).

Whichever system is used, unless an underground line is very short, the line must be spliced together. Because line failures are more likely to occur at the splice points, access must be provided for. In practice, this means that accessible underground concrete vaults are required approximately every ¼ to ½ mile of an underground line (Wise 4). Transition stations are required where underground systems connect to overhead systems.

Underground Lines Are Typically More Expensive. Based on various sources, underground lines are usually more expensive than overhead lines. The labor costs for burying cable and creating underground structures are higher. The air surrounding overhead lines serves as a free insulator. Underground lines must be surrounded with insulation material to dissipate heat. Overhead lines can sometimes be routed over areas that underground lines would have to go around.

For a 2006 report, Virginia's Joint Legislative Audit and Review Commission compiled comparisons of the estimated costs of overhead and underground lines. The average ratios of underground line cost to overhead line cost were 3.8 times higher for 115 kilovolt lines, 6.1 times higher for 230 kilovolt lines, 8.5 times higher for 345 kilovolt lines, and 9.7 times higher for 400 kilovolt lines (Commonwealth of Virginia 34).

The American Transmission Company prepared two estimates for a proposed 345 kilovolt line in Dane County, Wisconsin: one using overhead line and one using an underground system.[3] There are four segments of line totaling 24.2 miles of overhead transmission. Going underground is 1.6 miles longer. The company's estimated overhead line cost is $119 million. The estimated cost for underground line is $521 million, more than 4 times higher than the overhead cost (American Transmission).

Some comparisons of the costs of overhead and underground lines are based only on construction costs. Estimates of the life-cycle costs indicate the total, long-term costs of each type, which include constructing, maintaining, and decommissioning and life expectancy. Depending on the source of information and the type of underground line analyzed, the cost disadvantage for underground lines may be reduced somewhat. According to a 2005 study, the construction costs of an XLPE line would be 6.4 times that of an overhead line. If life cycle costs are considered, the ratio increases to a range of 7.2:1 to 7.6:1. The ratio for construction costs for HPFF was estimated to be 9.5:1. Accounting for all life-cycle costs, the estimate ratio decreased to a range of 9.1:1 to 9.3:1 (Commonwealth of Virginia 36). In sum, underground lines' life-cycle costs may be no lower than for overhead lines, and any advantage may be too small to have a meaningful impact on the large initial disadvantage in construction costs.

An underground line typically requires 20 to 50 feet of right-of-way. An overhead line would usually require a right-of-way of 70 to 150 feet (Wise 5). The best-case scenario for cost competitiveness for underground is when the cost of right-of-way is extremely high. An example is a 69-mile, 345 kilovolt line under construction in Connecticut, which includes 24 miles of underground line. The estimated cost is $840 million to $990 million, which is $12.2 million to $14.3 million per mile. This is very expensive compared to the typical transmission line. An alternative proposal by the utilities building the line would have reduced the underground section to 4 miles, reducing the estimated cost by $90 million to $130 million. The estimated cost per mile for the alternative with more overhead line would have been 11 to 13 percent lower than for the route with 20 more miles of line underground ("Connecticut Power"). That is still more expensive than overhead lines, but the cost difference is much less than in typical applications.

[3] Dane County's population density is similar to that of Boone County, Kentucky. In Kentucky, only Campbell, Fayette, Kenton, and Jefferson Counties have more people per square mile.

Underground Systems Are Relatively Reliable but Take Longer To Repair. Transmission lines, whether overhead or underground, account for a relatively small share of interruptions of service to electricity customers. According to one source, approximately 2 percent of disruptions in service are due to transmission outages. According to a study of service interruptions over a 10-year period, transmission line problems were responsible for 12 percent of the hours that customers were without electricity. Partly this is because overhead towers and poles are designed to withstand high winds, and the height of the towers, poles, and lines make them less vulnerable to falling trees compared to distribution lines. Even if a transmission line goes out, power may be rerouted so that there is no interruption in service (Commonwealth of Virginia 54).

Underground transmission lines are at least as reliable as overhead lines and, depending on the type of line used, may have significantly fewer interruptions. Almost all studies indicate that the time to repair lines is significantly longer for underground transmission lines than for overhead lines.

Underground transmission lines are at least as reliable as overhead lines and, depending on the type of line used, may have significantly fewer interruptions. Almost all studies indicate that the time to repair lines is significantly longer for underground transmission lines than for overhead lines.

Comparing Overhead and Underground Transmission Lines. The following table highlights further differences between overhead and underground systems.

Table 1.4
Selected Impacts of Overhead and Underground Transmission Lines

Impact	Overhead Line	Underground Line
Visibility	Lines, poles, or towers; cleared areas; substations	Cleared areas, transition stations
Water crossings	Visible lines, poles, or towers	Disturbance during trenching or boring, potential oil leaks
Wildlife habitat	Trees removed, collisions, electrocution	Trees removed
Archaeological sites	Disturbance at pole footings	Disturbance during trenching
Historic sites	Visible lines, poles, or towers	Transition stations only
Land use	Height and use restrictions in right-of-way	No structures, limited use, longer construction time, narrower right-of-way
Agricultural land	Obstructions from poles, towers, and any guy wires	Plowing depth is limited, possible soil compaction and erosion, warmer soil may cause premature germination of seeds, land taken for vaults
Forest land	Loss of tall trees, wider cleared right-of-way	Loss of trees and shrubs, narrower cleared right-of-way
Road crossings	Span	Under
Airports	Obstructions	Not an obstruction
Access	Required at poles or towers	Required along entire route

Source: Compiled from Wise 5.

Health Concerns Related to Electromagnetic Fields

Electromagnetic fields (EMF) are invisible lines of force that surround all electrical devices, including power lines. Some studies have reported an increased risk for some types of leukemia associated with exposure to magnetic fields.

In Kentucky and other states, a concern is sometimes raised about health issues related to transmission lines. Some studies have reported an increased risk for some types of cancer associated with exposure to magnetic fields. Electromagnetic fields (EMF) are invisible lines of force that surround all electrical devices, including transmission lines. Electric fields increase as the voltage of the device increases but are reduced or shielded by materials, which include buildings, that conduct electricity. Current flowing through electric wires or devices produces magnetic fields that get stronger as current increases. Magnetic fields go through most materials and are harder to shield. Electric and magnetic fields decrease significantly as one gets further from the source (U.S. Dept. of Health. National. *Electric* 4-5).

According to a 1999 report from the National Institute of Environmental Health Sciences, scientific evidence that EMF "exposures pose any health risk is weak." The authors of the report concluded that "EMF exposure cannot be recognized as entirely safe" but that "aggressive regulatory concern" was not warranted.

According to a 1999 report from the National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health, scientific evidence that EMF

> exposures pose any health risk is weak. The strongest evidence for health effects comes from associations observed in human populations with two forms of cancer: childhood leukemia and chronic lymphocytic leukemia in occupationally exposed adults (U.S. Dept. of Health. National. *Health Effects*).

NIEHS reported the risk as weak because the associations between EMF and some types of leukemia were found primarily in one type of scientific study and not consistently found in other types. The associations between EMF and leukemia are from epidemiological studies. In this type of study, risk patterns for diseases in residential and occupational settings can be statistically analyzed in relation to exposure levels of EMF. One problem in interpreting results from these studies is that sometimes researchers are trying to measure individuals' past exposure to EMF. In addition, it may not be feasible to control for all the other factors that influence someone's risk of leukemia. There has not been consistent support for the epidemiological findings in the other types of studies: laboratory animal experiments, clinical studies with humans, and biological studies examining the mechanisms by which EMF could cause cancer (Gradient 8).

The authors of the NIEHS report concluded that "EMF exposure cannot be recognized as entirely safe" but that "aggressive regulatory concern" was not warranted. According to the report,

> [t]he human data are in the "right" species, are tied to "real-life" exposures and show some consistency that is difficult to ignore. This assessment is tempered by the observation that given the weak magnitude of these increased risks, some other factor or common source of error could explain these findings. However, no consistent explanation other than exposure to...EMF has been identified.
>
> Epidemiological studies have serious limitations in their ability to demonstrate a cause and effect relationship whereas laboratory studies, by design, can clearly show that cause and effect are possible. Virtually all of the laboratory evidence in animals and humans and most of the mechanistic work done in cells fail to support a causal relationship between exposure to...EMF at environmental levels and changes in biological function or disease status (U.S. Dept. of Health. National. *Health Effects* ii-iii).

The report's authors did suggest that power lines be sited to reduce exposure to EMF.

The report's authors did suggest that power lines be sited to reduce exposure and that the industry "continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards" (U.S. Dept. of Health. National. *Health Effects* 38).

At least six states have standards for maximum electric fields in the rights-of-way and/or at the edges of rights-of-way of transmission lines. At least four states have standards for magnetic fields at the edges of rights-of-way.

Some States Have Standards for Allowable Electromagnetic Fields. At least six states have standards for maximum electric fields in the rights-of-way and/or at the edges of rights-of-way of transmission lines: Florida, Minnesota, Montana, New Jersey, New York, and Oregon. At least four states have standards for magnetic fields at the edges of rights-of-way: Connecticut, Florida, Massachusetts, and New York (Commonwealth of Virginia 87; U.S. Dept. of Health. National. *Electric* 46).

In 2004, the Connecticut General Assembly enacted into law the requirement that the Connecticut Siting Council adopt standards for best management practices for EMF. The law also establishes a presumption that transmission lines of 345 kilovolts or more located adjacent to residential areas and other specified areas should be buried. The law allows an applicant to rebut this presumption by showing the council that burial is technologically infeasible, taking into account the reliability of the state's electric grid.

Chapter 2

Kentucky's Certification Process for Electric Transmission Lines

Prior to 2004, the construction of electric transmission lines in Kentucky was considered an extension in the usual course of business. Transmission owners usually did not need PSC's approval before undertaking transmission line projects.

Senate Bill 246, enacted in 2004, requires transmission owners regulated by PSC to apply for and be granted a Certificate of Public Convenience and Necessity (CPCN) before beginning construction on electric transmission lines of at least 138 kilovolts and at least 1 mile in length. The law provides for a forum in which individuals affected by the proposed construction can play an active role in the CPCN process. Individuals can request that PSC hold a public hearing in the county where the line would be located. If an individual wishes to play a more formal role, he or she can request to intervene in the case, which grants the person full rights of a party in the case.

In 2004, Senate Bill 246 amended KRS 278.020 to require transmission owners to apply for and be granted a Certificate of Public Convenience and Necessity before beginning construction on electric transmission lines of at least 138 kilovolts and of at least 1 mile in length. Exceptions, which do not require a CPCN, are the replacement or upgrading of an existing electric transmission line, the relocation of an existing transmission line to accommodate construction or expansion of a roadway or other transportation infrastructure, and an electric transmission line that is constructed solely to serve a single customer and that will pass over only that customer's property.

Senate Bill 246 also provided for a forum in which individuals affected by the proposed construction can play an active role in the CPCN process. Individuals can request that PSC hold a public hearing in the county where the line would be located. If an individual wishes to play a more formal role, he or she can request to intervene in the case, which grants the person full rights of a party in the case.

There are now two certification processes for the construction of electric transmission lines in Kentucky. Transmission owners that are regulated by PSC must apply to the commission for a Certificate of Public Convenience and Necessity. Entities not regulated by PSC must apply for a construction certificate through the Kentucky State Board on Electric Generation and Transmission.[1] Both processes are described in more detail below.

[1] For simplicity, this report typically refers to those applying as "transmission owners," "entities," or "applicants." For applicants to PSC, the statutory requirement applies to any "person, partnership, public or private corporation, or combination thereof" (KRS 278.020(1)). For applicants to the Siting Board, the requirement applies to any "person," which is defined as "any individual, corporation, political subdivision, governmental agency, municipality, partnership, cooperative association, trust, estate, or any other entity" (KRS 278.700(3)).

Public Service Commission

Notice of Intent To File an Application

A transmission owner that intends to construct an electric transmission line that requires PSC approval must submit a notice of intent to file an application with PSC 30 days to 6 months prior to filing a CPCN application. The owner must also publish a public notice of the proposed line in a local newspaper of general circulation in the county or counties where the line will be located. Notification must be made in writing to each individual landowner over whose property the proposed line will pass.

Any PSC-regulated transmission owner that intends to construct an electric transmission line that meets the above criteria must submit a Notice of Intent to File an Application with PSC at least 30 days prior to filing a CPCN application. The notice of intent must state the county or counties in which the proposed construction will occur and provide a brief description of the project. If the owner does not file its application within 6 months, the notice of intent expires.

Prior to filing a CPCN application, the transmission owner must also make its intentions known to both the general public and each landowner over whose property the proposed transmission line will cross. The public notice must be published in a local newspaper of general circulation in the county or counties where the line will be located. Notification must be made in writing to each individual property owner and must include a brief description of the project, a map showing the proposed route, the PSC docket number, and an explanation of the landowner's right to request a local public hearing or to intervene in the case. Appendix B contains a sample of some of the information sent for a project.

Utilities are directed by 807 KAR 5:120 to use addresses held at the county property valuation administrator's office for purposes of notifying landowners whose property will be crossed by a proposed transmission line. Several utility companies expressed concern to Program Review staff that these records are often out of date. Staff were told that in one instance an affected landowner did not receive written notification of a proposed line due to erroneous records from the property valuation administrator. This individual did hear about the local public hearing and did attend. Although there may be some segment of the relevant population that never reads or hears about the proposed project, staff learned of no better alternatives. It appears that utility companies make a good-faith effort to inform the public and that the current process is fair and relatively effective.

Submission of Application for Certificate of Public Convenience and Necessity to PSC

The written CPCN application to PSC must include all the facts on which the application is to be evaluated, including a demonstration that the proposed construction is or will be required by public convenience and necessity. The application must document that the applicant has met the requirements for notification of the general public and landowners.

The CPCN application must include all the facts on which the application is to be evaluated, including a demonstration that the proposed construction is or will be required by public convenience and necessity. The applicant must also submit a certified statement that all property owners have been contacted over whose land the proposed transmission line will cross and must demonstrate that a notice to construct was published in a local newspaper. Maps showing the location of the proposed project must accompany the application. These maps must show the location of the proposed right-of-way, identify the centerline, the boundary of each property crossed by the proposed transmission line, and any alternative routes that were considered.

Public Participation

An affected person requesting a public hearing under KRS 278.020(8) must submit a written request to PSC within 30 days of the application being judged administratively complete. Local public hearings are informal proceedings that give the public an opportunity to be heard by PSC and are held in the county where the project is proposed.

An affected person requesting a public hearing under KRS 278.020(8) must submit a written request to PSC within 30 days of the application being judged administratively complete. This request must specify whether the individual wishes to participate in an evidentiary hearing or to make unsworn public comments.

Local public hearings are informal proceedings that give the public an opportunity to be heard by PSC and are held in the county where the project would be located. At least 5 days before the date established by the commission for a local public hearing, the applicant must submit proof to PSC that it has given the public notice of the hearing in a local newspaper of general circulation.

Local hearings are one of the most effective avenues for disseminating information to the public about proposed transmission line projects. These meetings are often held in easily accessible public buildings such as community centers and churches and at a time that is convenient for the working public. Detailed maps showing the transmission right-of-way and property boundaries are usually posted at the meeting place. Utility companies typically have right-of-way agents, engineers, and environmental specialists available to address concerns and answer questions. Company representatives sometimes learn about potential problems with siting that might not have been identified in the planning process. For example, small family cemeteries or newly constructed out buildings might not show up on the topographic maps or aerial photographs. Based on conversations with the affected landowners, minor adjustments to the centerline

can be made in an attempt to avoid such areas prior to construction.

In recent years, the number of people who attended hearings varied widely among projects. Some hearings had only one person attend. In at least two cases, more than 100 people attended the local hearings.

The number of people who attended hearings varied widely among projects in recent years. Some hearings had only one person. In at least two cases, more than 100 people attended the local hearings. On average, approximately 25 percent of attendees made oral comments at the hearings, but only 1 percent followed up by filing written comments with PSC.

An affected person interested in participating in a formal hearing that PSC may schedule must request in writing to intervene in the case within 30 days of the CPCN application being judged administratively complete. Evidentiary hearings are formal proceedings, with sworn testimony limited to the applicants and the parties to the case, which include intervenors.

An affected person interested in participating in a formal hearing that PSC may schedule must request in writing to intervene in the case pursuant to 807 KAR 5:001, sec.3(8) within 30 days of the CPCN application being judged administratively complete. Evidentiary hearings are formal proceedings, with sworn testimony limited to the applicants and the parties to the case, which include intervenors. PSC will consider any request to intervene as a limited intervention unless the individual submits a written request for full intervention. A person making only a limited intervention will be entitled to the full rights of a party at the hearing and shall be provided orders issued by PSC but will not receive filed testimony, exhibits, pleadings, correspondence, and all other documents submitted to parties who are granted full intervention.

Commonly Expressed Public Concerns

The most commonly expressed opposition by landowners to proposed construction was that they did not want an unsightly transmission line crossing their property. Another commonly expressed public concern was that the construction of an electric transmission line would greatly diminish the value of a landowner's property.

Based on Program Review staff's review of case files, the most commonly expressed opposition by landowners to proposed construction was that they did not want an unsightly transmission line crossing their property. The certificate process is a legal process and landowners have the burden of proving that the negative impact to them outweighs the greater public need and necessity. According to PSC legal staff, arguing that an individual does not want a line on his or her property or that the utility could just as easily locate the line somewhere else does not satisfy evidentiary standards.

Another commonly expressed public concern was that the construction of an electric transmission line would greatly diminish the value of a landowner's property. Under most circumstances, this would not play a role in PSC's decision of whether or not to certify a project. Ultimately, negotiations about property value occur between landowners and transmission companies. If the landowners believe that the price offered for their land is unfair, they can take the issue before the Circuit Court.

PSC Must Issue a Decision Within 120 Days

PSC must issue its decision no later than 120 days after the application is filed. This includes the regular review period of 90 days and a 30-day extension the commission may exercise for good cause.

PSC must issue its decision no later than 120 days after the application is filed. This includes the regular review period of 90 days and a 30-day extension the commission may exercise for good cause. The final decision is based on information submitted by the applicant, evidence and public comments from the formal hearing, other public comments, and reports submitted by consultants to PSC.

Per KRS 278.400, any party to a case may apply for a rehearing within 20 days after PSC has issued its final determination. The commission can grant or deny the request within 20 days after it is filed or not act on the application within that period, which serves as a denial of the application. If the rehearing is granted, any party to the case can offer additional evidence that "could not with reasonable diligence" have been offered in the former hearing. Upon the rehearing, PSC can "change, modify, vacate, or affirm" its former orders.

State Board on Electric Generation and Transmission Siting

The Kentucky State Board on Electric Generation and Transmission Siting is responsible for reviewing all certificate applications from anyone not regulated by PSC for the construction of electric transmission lines that are capable of carrying 69 kilovolts or more. A transmission owner that intends to construct a transmission line must file a notice of intent to file with the Siting Board 30 days before submitting a certificate application. The Siting Board contacts the governor and the county and city governments where the proposed facility would be located. The ad hoc members of the Siting Board are appointed during the 30-day notice period. During this period, the applicant must publish a construction notice in a local newspaper of general circulation.

The Kentucky State Board on Electric Generation and Transmission Siting is responsible for reviewing all certificate applications from anyone not regulated by PSC for the construction of electric transmission lines that are capable of carrying 69 kilovolts or more (KRS 278.714; KRS 278.700(5)). This section describes the process and minimum filing requirements as detailed in 807 KAR 5:110.

Notice of Intent To File: Certificate Application

A transmission owner that intends to construct a transmission line must file a notice of intent to file with the Siting Board at least 30 days before submitting a certificate application. The notice must identify the county or counties where the construction is proposed, provide a brief description of the project, and list the planning and zoning commission(s) with jurisdiction over the project area.

When the notice of intent is deemed complete, the Siting Board contacts the governor and the county and city governments where the proposed facility would be located. The ad hoc members of the Siting Board are appointed during the 30-day notice period.

During the notice period, the applicant must make public its intentions by publishing a construction notice in a local newspaper of general circulation. This notice must provide a brief description of the project, including the location of the line, and a statement informing the public that the proposed line is subject to the Siting Board's approval.

Thirty days after the notice of intent has been submitted, the applicant can file a certificate application to the Siting Board. The application must contain a full description of the proposed route of the transmission line; evidence that the public has been notified of the project; and maps showing the location of the centerline, right-of-way, and the names and property boundaries of each parcel the line will cross.

Local Hearing

The Siting Board will schedule a local public hearing if it has received a written request from any local governmental entities or from at least three county residents within 30 days of the filing of a complete certificate application.

The Siting Board will schedule a local public hearing if it has received a written request from any local governmental entities or from at least three county residents within 30 days of the filing of a complete certificate application. These local hearings are informal proceedings held to give the public an opportunity to be heard by the board. At least 20 days before the hearing date, the Siting Board will give notice to all parties in the proceeding, the county judge/executive, the mayor, and planning commission. Within 7 days after the local public hearing, the Siting Board must file a summary of the public comments made at the hearing in the official record of the case.

Public Participation

Any party to the case wishing to have a formal evidentiary hearing must submit a written request to the Siting Board within 30 days of a complete application being filed. A person interested in becoming a party to the formal hearing must submit a written request to the Siting Board within 30 days of the application being judged administratively complete.

A person interested in becoming a party to the proceeding under 807 KAR 5:110(4) must submit a written request to the Siting Board within 30 days of the application being judged administratively complete. The board will grant someone status as an intervenor if it can be shown that the individual has a special interest in the proceeding, or that the individual's participation in the proceeding will assist the Siting Board in reaching its decision and would not unduly interrupt the proceeding. Intervenors have the right to participate fully in the proceedings, including the right to file requests for information from the applicant or other parties, and to cross-examine witnesses during formal proceedings.

Any party to the case wishing to have an evidentiary hearing must submit a written request to the Siting Board within 30 days of a complete application being filed. The evidentiary hearing is a

formal proceeding, with sworn testimony limited to the applicants and the parties to the case, which include intervenors. It may be held in the county where the line would be located or at PSC offices in Frankfort.

The Siting Board Must Issue a Decision Within 120 Days

The Siting Board is required to make its decision no later than 120 days after the submission of a complete application.

The Siting Board is required to make its decision no later than 120 days after the submission of a complete application. The final decision is based on information submitted by the applicant, evidence and public comments from the hearing, other public comments, and reports submitted by consultants to the Siting Board.

Issues Related to PSC and Siting Board's 120-day Review Periods

Under current law, the Siting Board and PSC have up to 120 days to either grant or deny a certificate. Program Review staff's interviews and analysis of case records indicated differing opinions as to whether 120 days is enough time to make a well-informed decision.

PSC commissioners, staff, and past employees identified the 120-day review period as a critical problem, particularly when outside consultants have scheduling conflicts with other projects when they are called on to help evaluate transmission line cases.

PSC commissioners, staff, and past employees all identified the 120-day review period as a critical problem. Such a time frame can put PSC and the Siting Board in a bind if necessary outside consultants have scheduling conflicts with other projects when they are called on to help evaluate a transmission line case. PSC commissioners told staff that an additional 60 to 90 days would be their preferred time limit for making decisions. Intervenors in past cases and their attorneys indicated to Program Review staff that the 120-day schedule can hinder their ability to build effective cases.

Intervenors in past cases and their attorneys indicated to Program Review staff that the 120-day schedule can hinder their ability to build effective cases. This is particularly true when they have to hire expert witnesses or review extensive amounts of highly technical documents. For example, an intervenor in East Kentucky Power's Warren County case (2005-00207) told staff that they requested further explanation of the EPRI-GTC siting method and received 20 CD-ROMs and two large boxes of technical reports only 2 days before the evidentiary hearing. Intervenors' attorneys said that the 120-day review period does not allow for a second round of discovery, especially if the CPCN applicant disputes the first request. Several intervenors have even argued that the short time frame is a violation of their constitutional right to due process.

Multiple sources told Program Review staff that it would be possible for intervenors to drag the process out indefinitely if there were no time limit. PSC commissioners told staff that an additional

60 to 90 days would be their preferred time limit for making decisions.

Most utility representatives said that 120 days was sufficient time for the Siting Board and PSC to make well-informed decisions. For utility companies, the 120-day review period effectively represents a 4-month hiatus in the middle of a transmission line project after routing is nearly completed but before construction begins. In some cases, minimal delays in the certificate process can force a utility company to delay a project for up to another year because of environmental compliance.

Most utility representatives said that 120 days was sufficient time for the Siting Board and PSC to make well-informed decisions. Some mentioned that the current review period might be too lengthy if the utility company is pursuing some economic development opportunity.

For utility companies, the 120-day review period represents a 4-month hiatus in the middle of a transmission line project after routing is nearly completed but before construction begins. In some cases, minimal delays in the certificate process can force a utility company to delay a project for up to a year because of issues related to environmental compliance. For example, if Indiana bats, which are an endangered species, are found in the project area on private land, a transmission owner's window for clearing right-of-way is restricted to between October 15 and March 31. If an area where Indiana bats hibernate is found within 10 miles of the project area, the clearing window is further restricted to between November 16 and March 31. If the project involves land in the Daniel Boone National Forest, the November 15 to March 31 clearing window is triggered if a hibernating area is found within 5 miles of the project area (U.S. Dept. of Agriculture). Similar time constraints can occur with endangered plant species. For example, if a CPCN is approved in November and potential habitat for one of these endangered plants occurs in the project area, the utility company may be forced to wait until the following May or June before a survey can be conducted to determine the presence or absence of the species.

Time limits vary in surrounding states that require approval of new transmission lines. In Ohio, the Power Siting Board must decide within 60 to 90 days after the application has been accepted. But this is after staff has had up to 60 days to determine whether the application is in compliance with all requirements. According to staff with Virginia's State Corporation Commission, approval can take up to 1 year. If no public hearing is held, West Virginia's Public Service Commission has up to 60 days to decide. If a hearing is held, the commission has up to 90 days after final oral arguments or briefs are submitted.

Conflicts Between State and Federal Processes

Any CPCN applicant that uses federally guaranteed loans, which are usually administered through the Rural Utilities Service, must comply with the National Environmental Policy Act (NEPA) before those funds are released. This law requires that prior to taking any major action, the acting party must consider the environmental impact of that action. The NEPA process involves public involvement, field surveys, preparation of environmental reports, and concurrence from the lead federal agency.

Any CPCN applicant that uses federally guaranteed loans, which are usually administered through the Rural Utilities Service, must comply with the National Environmental Policy Act (NEPA) before those funds are released. This law requires that prior to taking any major action, the acting party must consider the environmental impact of that action. Both the NEPA process and Kentucky's CPCN process require the utility company to develop a centerline of the route for the proposed transmission line. There is no guarantee, however, that a centerline approved under one process will be approved by the other.

Representatives of many of the utility companies interviewed by Program Review staff said that dealing with both NEPA compliance and the process of obtaining a CPCN for transmission line projects presents them with a chicken and egg scenario. Each process requires the applicant to develop a transmission centerline that may or may not be approved under the other process. An example was East Kentucky Power's application for a CPCN that passed through the Daniel Boone National Forest. The U.S. Forest Service had previously approved the utility's preferred route, but PSC denied the CPCN application because East Kentucky Power had not fully evaluated other alternate routes.

Some NEPA compliance issues may require utility companies to mitigate the effects of a specific project by adjusting a transmission centerline to avoid or minimize potential impact to a cultural resource. Recent PSC orders, however, have required that approved transmission centerlines cannot be adjusted by more than 500 feet in either direction and then only by written agreement with the property owner.

Some NEPA compliance issues may require utility companies to mitigate the effects of a specific project by adjusting a transmission centerline to avoid or minimize potential impact to a cultural resource. Recent PSC orders, however, have required that approved transmission centerlines cannot be adjusted by more than 500 feet in either direction and then only by written agreement with the property owner. (Cases 2005-00207 and 2005-00467 are examples.) This limitation can create significant conflicts if the federal requirement to mitigate involves an adjustment of more than 500 feet or the property owner does not agree to the move. A representative of a cultural resource management consulting firm told staff that utility companies' inability to shift transmission lines more than 500 feet ensures that they cannot effectively comply with NEPA.

Summary of Certificate Cases

Program Review staff analyzed cases that have come before PSC since KRS 278.020 was amended in 2004. PSC handed down 12 decisions on CPCN applications during this period; 9 were granted and 3 were denied. Staff's evaluation of cases before the Siting Board went back to 2002. Over the past 5 years, the Siting Board

has approved three applications for the construction of electric transmission lines and denied none. Table 2.1 provides a summary of the specific voltage and mileage of projects that came before both agencies.

Table 2.1
Summary of PSC's Certificate of Public Convenience and Necessity Cases and Siting Board's Construction Certificate Cases

	Voltage (kilovolts)	Miles Granted	Miles Denied	Total Miles
PSC:	138	15.2	19.3	34.5
CPCN Cases	161	122.2	0.0	122.2
Since 2004	345	80.1	85.8	165.9
	Total	217.6	105.1	322.7
Siting Board:	138	138.0	0.0	138.0
Construction Certificate	345	20.0	0.0	20.0
Cases Since 2002	Total	158.0	0.0	158.0

Note: Miles may not add exactly to totals due to rounding.
Source: Compiled by Program Review staff based on case files of PSC and the Siting Board.

Chapter 3

How the Public Service Commission Decides Electric Transmission Line Cases

Legal Overview

The process for siting new electric transmission lines changed in 2004 to require a Certificate of Public Convenience and Necessity and to allow affected persons to require public hearings and to intervene in the application.

In 2004, Senate Bill 246 amended KRS 278.020 to require a Certificate of Public Convenience and Necessity to construct an electric transmission line of at least 138 kilovolts and at least 1 mile in length (KRS 278.020(2)). It allowed an affected person to require the Public Service Commission to conduct a public hearing. It also allowed an affected person, such as someone over whose property the proposed transmission line will cross, to intervene in the application (KRS 278.020(8)).

In deciding CPCN cases, the Public Service Commission has gradually articulated a rationale and clarification for the factors established in the controlling court case *Kentucky Utilities Company v. Public Service Commission.* However, each CPCN case is different, and there is no rule of thumb that guarantees approval of an application.

Some controversy surrounded PSC's initial interpretation of what factors to consider when granting a CPCN for electric transmission lines. Of particular importance was how to interpret the controlling court case, *Kentucky Utilities Company v. Public Service Commission* (252 S.W. 2d 885, Ky. 1952). Two areas, in particular, needed clarification. First, how should the reasonableness of the chosen route be determined, including whether alternatives were sufficiently identified and considered? Second, should the least-cost route be preferred? If not, how should the factors be balanced?

Case by case, PSC gradually articulated a rationale for these areas. By the time a CPCN was granted to East Kentucky Power Cooperative in September 2007, the process had been greatly clarified. However, each situation is different, and cases are necessarily decided on an individual basis. There is no rule of thumb that guarantees that an application will be approved.

Public Participation

Before 2004, individual landowners could not intervene. That has now changed.

Before 2004, individual landowners potentially affected by new electric transmission lines could not necessarily intervene when the lines were proposed. This was because they were not considered "interested persons" in an application for a CPCN under the case *Satterwhite v. Public Service Commission* (474 S.W. 2d 287, Ky. 1971). That has changed. KRS 278.020(8) states that "any interested person, including a person over whose property the proposed transmission line will cross, may request intervention,

and the commission shall, if requested, conduct a public hearing...." An interested person also includes a landowner whose land may be crossed, even if such crossing is not definitely known when the transmission owner files an application to build a new line (Commonwealth of Kentucky. Public. *Statement.* Section 8).

Elements of a CPCN for a New Electric Transmission Line

The elements required to grant a CPCN for a new electric transmission line are set out in the *Kentucky Utilities* case of 1952. The first element is the need for the new line(s). The second element is the absence of wasteful duplication resulting from the construction of the new transmission line(s).

In 1952, the Kentucky Court of Appeals—at that time the highest court in Kentucky—set out the elements required to grant a CPCN to construct electric transmission lines in *Kentucky Utilities Company v. Public Service Commission* (252 S.W. 2d 885, Ky. 1952).

The first element required is "need" for the new lines. Need involves the following considerations:

- a showing of substantial inadequacy of existing service, and
- a consumer market sufficiently large to make it economically feasible for the new line(s) to be constructed and operated.

The second element required is the "absence of wasteful duplication" resulting from the construction of the new transmission lines. Duplication involves the following considerations:

- an excess of capacity over need;
- an excessive investment in relation to productivity or efficiency; and
- an unnecessary multiplicity of physical properties, such as rights-of-way, poles and wires.
    - An unnecessary multiplicity involves "inconvenience to the public generally, and economic loss through interference with normal uses of the land, that may result from multiple sets of rights-of-way and a cluttering of the land with poles and wires."

In its *Kentucky Utilities* decision, the court emphasized that the cost factor is not to be given greater consideration than the need for service.

The court emphasized, however, that the "cost" factor in considering duplication is not to be given more consideration than the "need" for service. If it appears that an existing facility cannot or will not provide adequate service, it might be proper for some duplication and some economic loss to be suffered, so long as the duplication and resulting loss are not greatly out of proportion to the need for service.

Prior to 1992, applying for a CPCN for electric transmission lines was somewhat informal. In 1992, Kentucky's highest court ruled that construction of new electric transmission lines could be considered extensions in the usual course of business. As of 2004, transmission owners are required by statute to go through a formal, rigorous process to obtain a CPCN.

The 2004 amendments to KRS 278.020 also represented a big change for transmission owners in that it required them for the first time to undergo a rigorous, formal process to obtain a CPCN for a new electric transmission line. Prior to 1992, the process had been somewhat informal. In 1992, Kentucky's highest court ruled in *Duerson v. East Kentucky Power Cooperative, Inc.* (843 S.W. 2d 340, Ky. 1992) that the construction of new electric transmission lines "may" be considered extensions in the usual course of business, and thus, under KRS 278.020(1), "may" not require a CPCN. The door was left open for PSC to require an applicant to apply for a CPCN if it saw the need.

Clarifying the Wasteful Duplication Element for Granting a CPCN

In initial cases, PSC denied some lines because the applicants had failed to demonstrate that the proposed lines did not involve wasteful duplication. Gradually, PSC and the utilities reached clarification on the process for demonstrating this element.

Transmission line siting cases that came before PSC following the 2004 amendment to KRS 278.020 saw a gradual refinement in the meaning of the element of absence of wasteful duplication. In general, the need element was clearly understood. In initial cases, PSC denied some lines because the applicants had failed to demonstrate that the proposed lines did not involve a wasteful duplication of existing facilities. Gradually, PSC and the utilities worked out a process for demonstrating this element.

An applicant for a CPCN must establish two factors to demonstrate an absence of wasteful duplication: a thorough review of all reasonable alternatives has been conducted and the proposed route is reasonable. To do this, applicants must show that they considered using existing utility corridors and rights-of-way. Applicants can provide evidence for establishing the necessary factors by using the Kentucky Transmission Line Siting Model.

To demonstrate an absence of wasteful duplication, an applicant for a transmission line CPCN must establish two factors:

- it has conducted a thorough review of all reasonable alternatives, and
- its choice of the proposed route was reasonable (PSC Case No. 2005-00207, Oct. 31, 2005).

To do this, the applicant must show that it comprehensively considered the use of existing utility corridors and other rights-of-way (PSC Case No. 2005-00089, Aug. 19, 2005).

One way an applicant can provide evidence for establishing the two factors is by using the Kentucky Transmission Line Siting Model to develop the best route for the proposed transmission line (PSC Case No. 2006-00463, Sept. 19, 2007).

Before 2004, the least-cost method for choosing a route was usually used. This has changed. PSC emphasizes rebuilding existing lines and colocating new lines with existing routes, even if it costs more.

A change in the determination of whether a new line represents a wasteful duplication is the weighing of the cost of building the route. Prior to the changes to KRS 278.020 in 2004, the least-cost method was generally used. The more expensive the route, the more of a wasteful duplication it was assumed to represent. This meant that the route that cost the least to build was generally the

route that was chosen. As of 2004, PSC began to emphasize rebuilding of existing lines and colocating new lines with existing routes as goals of transmission planning. In some cases, choosing a route with more rebuilding or colocating could make the overall cost of the route higher; however, PSC might favor it anyway.

There is no minimum level of colocation that must be used in siting a new line. PSC weighs the cost against reliability and impacts on landowners.

There is no minimum level of colocation that must be used in siting a transmission line. In conducting its analysis, PSC considers a number of relevant factors in addition to cost, including reliability of service and the impacts on landowners (PSC Case No. 2005-00467 and Case No. 2005-00472 Consolidated, May 26, 2006).

While rebuilding is often more expensive than a new line, it does not require new easements and may be faster and easier to build and may be more acceptable to the community.

For example, in a recent application from East Kentucky Power Cooperative, the route chosen by the applicant and approved by PSC was the most expensive of the three best routes, but it contained the largest portion of rebuilding (PSC Case No. 2006-00463, Sept. 19, 2007). Rebuilding is generally more expensive than the construction of a new line. It does not require the acquisition of new easements though, so it is often faster and easier to build and more acceptable to the community.

In some instances, a route with more rebuilding or colocating could cost so much more to construct that it would be unreasonable.

However, PSC, in this same case, noted that in some instances, choosing a route with more rebuilding or colocating could make the overall cost of the route unreasonable when compared to a route with less rebuilding or colocating. There is no rule of thumb. Utilities have argued that this is somewhat arbitrary and that they would like more predictable guidelines on this issue.

Review of a Specific Route, Moving the Centerline After a CPCN Is Granted

An application for a CPCN for a new electric transmission line must specify the exact route of the proposed line.

PSC requires that an application for a CPCN for a new transmission line specify the exact route of the proposed line and the location of its centerline.

At first, there was some objection by utilities to PSC's review of the specific route proposed. Utilities argued that only the proposed corridor should be part of the application. They maintained that compliance with federal regulations may require an adjustment of up to a ½-mile wide corridor after a utility obtains a CPCN. Thus, PSC's role is only to review the need and duplication issues rather than the specific route.

PSC has said that because KRS 278.020(8) requires that affected landowners be able to intervene, they must know the exact proposed route in order to determine whether they want to intervene.

PSC addressed this issue in 2004. A CPCN applicant is required by 807 KAR 5:120, sec. 2(2) to submit a map showing the location of the proposed transmission line centerline. That regulation also incorporates 807 KAR 5:001, sec. 9(2), which requires that an application contain a full description of the proposed route. The PSC's reasoning for requiring utilities to provide exact route information to obtain a CPCN is that KRS 278.020(8) requires that affected landowners be able to intervene. In order for such landowners to be able to determine how they are affected and whether they should intervene in an application, they must know the exact proposed location of the line and the location of poles and towers (Commonwealth of Kentucky. Public. *Statement.* Section 7).

PSC allows a transmission owner to move the centerline of a transmission route after approval if the move is no greater than 500 feet in either direction, a new property owner is not involved, and the property owner agrees in writing.

PSC allows a transmission owner to move the centerline of a transmission route after it has been approved if

- the move is no greater than 500 feet in either direction of the approved route (a 1,000-foot corridor),
- the move does not shift the line or its right-of-way onto the property of a different landowner, and
- the property owner who is subject to the move agrees in writing to the requested move (PSC Case No. 2006-00463, Sept. 19, 2007).

If the centerline is moved, the transmission owner must file with PSC a survey of the final location of the line after all moves are completed and before construction begins. Any changes greater than the distance mentioned above, or involving landowners not identified in the original application, will require the transmission owner to seek an amendment with PSC.

Some utilities would like the ability to adjust the centerline within a 1/2-mile wide corridor.

Utilities have indicated that they would like the ability to adjust the centerline within a ½-mile wide corridor without having to seek an amendment to the CPCN. One utility suggested a revision to allow a utility and a landowner to make, in writing, *any* changes after a CPCN is granted as long as the changes do not affect another landowner without his or her approval.

Summary of PSC Cases

The following section is a review of PSC cases issued since KRS 278.020 was amended in 2004. It is organized by issue, so some cases are presented more than once, each time focusing on a different issue in the case.

The following is a review of the cases issued by PSC since KRS 278.020 was amended in 2004, including an explanation of how each case affected the process by which a CPCN is granted. The cases are arranged based on their relevance to six issues:

1) PSC encourages utilities to use existing facilities and rights-of-way. Whether or not the use of existing facilities is considered a wasteful duplication depends on other factors involved in each case.
2) Determining the absence of wasteful duplication of facilities involves a two-step process requiring a CPCN applicant to conduct a thorough review of all reasonable alternative routes.
3) PSC reviews the exact route of a new transmission line, not just the corridor.
4) There are restrictions on moving the centerline after a CPCN has been issued.
5) There is no designated order in which a CPCN and permits from other agencies are obtained.
6) It is not within PSC's scope to decide whether the time frame violates intervenors' due process rights.

Some cases are presented more than once, and the legal issue discussed in the text is different each time. Unless noted otherwise, the information was taken from the Final Orders of the cases.

Issue 1: PSC encourages utilities to use existing facilities and rights-of-way. Whether or not the use of existing facilities is considered a wasteful duplication depends on other factors involved in each case.

PSC Case No. 2003-00380

An investigation of the proposed construction of transmission facilities in Mason and Fleming Counties by East Kentucky Power Cooperative

Decided December 30, 2003

The CPCN was granted because the project could not reasonably use existing facilities or rights-of-way, the project did not constitute wasteful duplication, and East Kentucky Power Cooperative's decision to pursue the project was reasonable.

This case is included here to provide a baseline for how PSC viewed an application for a new transmission line CPCN before the 2004 amendments to KRS 278.020. PSC held an investigation on its own motion because it had received so many letters from the public and local officials and a petition from residents. PSC stated that making full use of existing facilities and

rights-of-way is a commendable goal and is shared by the commission. In this case, however, the alternatives were not equal to the proposed project in terms of cost and service reliability.

PSC Case No. 2004-00365

Big Rivers Electric Corporation's application for a CPCN to construct a transmission line in Breckinridge and Meade Counties

Applied October 25, 2004 (application found deficient)
Refiled November 15, 2004
Decided February 28, 2005

The CPCN was granted because there was a need and demand for the proposed project, and a study of alternatives showed that the proposed line was less costly and more effective in resolving reliability concerns and would not result in an unreasonable duplication of facilities.

The commission and some landowners were interested in one alternative route that involved a 3-mile interconnection with an existing line. The estimated cost for this alternative exceeded by about $6 million the cost for the project proposed by Big Rivers. The commission concluded that the line proposed by Big Rivers was the preferred solution for reliability issues.

PSC Case No. 2004-00320

East Kentucky Power Cooperative's application for a CPCN to construct a substation and transmission line in Spencer County

Applied December 14, 2004 (application found incomplete)
Refiled January 11, 2005
Decided March 30, 2005

The CPCN was granted because there was need for the proposed line and it would not result in an unreasonable duplication of facilities.

East Kentucky Power Cooperative had narrowed the number of most feasible routes to two. One was to rebuild an existing line, which would cost more but would not improve service reliability as much as the other route. The alternative, favored by East Kentucky Power Cooperative, was to construct a new line. The commission found that the applicant's preferred new line was the most effective solution based on reliability concerns. Since there was a likelihood of even faster load growth than projected or of growth spikes, the new line was preferable.

PSC Case No. 2005-00089 (First Rowan Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Rowan County

Applied April 21, 2005
Decided August 19, 2005

The CPCN was denied because the proposed route did not adequately consider the use of existing rights-of-way and transmission lines and corridors, so it violated the *Kentucky Utilities Company v. Public Service Commission* standard for absence of wasteful duplication of facilities.

The commission noted that no one disagreed that a proposed alternative route that would share more existing rights-of-way would cost more.

The commission stated that it has an obligation to make findings on the issue of the "cluttering of the land with poles and wires." The commission found that creating a new corridor for the construction of a transmission line would result in a wasteful duplication of facilities due to the existence of an alternative route that was slightly more costly but would use existing rights-of-way. The commission stated that future applications should comprehensively consider the use of existing corridors in planning future transmission.

PSC Case No. 2005-00467 and Case No. 2005-00472 Consolidated

Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties (Case No. 2005-00467); and
Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of alternative transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties (Case No. 2005-00472)

Applied December 22, 2005
PSC issued an order consolidating the two applications on January 6, 2006
Decided May 26, 2006

The CPCN was granted in Case No. 2005-00467 because the chosen route did not constitute unnecessary or wasteful duplication of facilities and there was a need. Case No. 2005-00472 (alternate route) was dismissed as moot because the preferred route was granted.

As described earlier, in the first Rowan case, the commission found that East Kentucky Power Cooperative should have considered a route that cost about 20 percent more than its requested route, but PSC did not intend that number to set a precedent or benchmark for future cases. What is considered a reasonable cost will vary from case to case.

Several intervenors argued that the utilities should have selected an alternative route. They argued for the use of only those routes that have at least 80 percent colocation, regardless of the higher cost.

The commission said it has not set a minimum level of colocation that must be used by a utility in siting a transmission line. Among the factors PSC also considers are impacts on landowners, reliability, and cost. An applicant must establish that its route selection is reasonable based on those factors. The commission has long encouraged consideration of least-cost alternatives for meeting projected needs, without explicit consideration on rate impact. Total project cost should not be the sole factor in transmission route selection, but it is one of the important factors to consider.

PSC Case No. 2006-00463

East Kentucky Power Cooperative's application for a CPCN for the construction of an electric transmission project in Clark, Madison, and Garrard Counties

Applied May 22, 2007
Amended application August 15, 2007
Decided September 19, 2007

The CPCN was granted because the proposed transmission line was necessary and reasonable and its construction did not result in wasteful duplication of facilities. Further, the selection of the route was reasonable in light of the circumstances.

East Kentucky Power Cooperative used the Kentucky Transmission Line Siting Model, which is based on the Electric Power Research Institute-Georgia Transmission Corporation (EPRI-GTC) method, to develop the route of its proposed transmission line. The route chosen was the most expensive of the three best routes, but it contained the largest portion of rebuilding. According to East Kentucky Power Cooperative, the greater the amount of rebuilding, the more desirable the route. Rebuilding is generally more expensive than the construction of a new line, but it does not require the acquisition of new easements. Amending and expanding existing easements for rebuilding is generally much faster and easier than acquiring greenfield easements. Also, rebuilding an existing line is more acceptable to the community than the construction of a new line.

PSC concluded that East Kentucky Power Cooperative needed the proposed lines to meet service requirements and found that none of the alternatives was viable. It found that the preferred route was reasonable and took maximum advantage of opportunities for colocation.

PSC noted that in prior orders it had emphasized rebuilding and colocating as goals of transmission planning. These goals may not be an overriding factor in every case, however. In some cases, a route with more rebuilding or colocating could make the overall cost of the route unreasonable when compared to a route with less rebuilding or colocating. The standard is one of reasonableness.

Issue 2: Determining the absence of wasteful duplication of facilities involves a two-step process requiring a CPCN applicant to conduct a thorough review of all reasonable alternative routes.

PSC Case No. 2005-00154

Kentucky Utilities Company's application for a CPCN for the construction of transmission facilities in Anderson, Franklin, and Woodford Counties

Applied May 11, 2005
Decided September 8, 2005

The CPCN was denied because the applicant's study of alternative routes was not sufficiently comprehensive.

This application was one of a package of three proposed transmission lines before the commission. Orders in the other two cases—2005-00142 and 2005-00155—were issued on the same date. The package of these three lines represented the least-cost option.

The record did not indicate that Kentucky Utilities Company had conducted a detailed analysis of alternative lines. The company estimated that an alternative route proposed by intervenors would cost an additional $1.84 million compared to the proposed route. Kentucky Utilities Company said that there would not be a billable difference to customers.

The commission said it must balance all relevant factors, including cost. The utility looked at various alternative routes, but the record did not indicate that it conducted a comprehensive analysis of routes that would follow existing transmission lines or other existing right-of-way corridors. The intervenor had identified a route that Kentucky Utilities Company had not thoroughly analyzed, so its study of alternative routes was not sufficiently comprehensive.

PSC Case No. 2005-00155

Louisville Gas and Electric Company's application for a CPCN for the construction of transmission facilities in Trimble County

Applied May 11, 2005
Decided September 8, 2005

The CPCN was granted because proposed line was needed and there was no evidence of wasteful duplication of facilities.

This application was one of a package of three proposed transmission lines before the commission. Orders in the other two cases—2005-00142 and 2005-00154—were issued on the same date.

PSC Case No. 2005-00101

Kentucky Power Company's application for a CPCN to construct a transmission line in Leslie County

Applied June 17, 2005
Decided September 19, 2005

The CPCN was granted because the line was needed to assure reliability of service, the proposed line was the most effective solution, the proposed line did not result in wasteful duplication of facilities, and there were no existing rights-of-way that could be used.

PSC Case No. 2005-00207 (Warren Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Barren, Warren, Butler, and Ohio Counties

Applied July 1, 2005
Decided October 31, 2005

The CPCN was granted because East Kentucky Power Cooperative had conducted an acceptably thorough review of alternative line locations, and the commission concluded that the applicant's choice of a location for the line was reasonable.

PSC said each case was unique and must be decided on its own facts. Through its planning process, a utility should be able to conduct the survey required by KRS 278.020 well in advance of the filing of an application for a CPCN. In this case, East Kentucky Power Cooperative had had no such advance notice. It could not have started planning the proposed line until Warren Rural Electric Cooperative Corporation gave the Tennessee Valley Authority notice of its intention to switch power suppliers. The commission also recognized the applicant's efforts to comply with its interpretation of the new statutory requirements, as East Kentucky Power made a reasonable and good-faith effort to identify, analyze, and document its consideration of alternative line locations. That about half of the line does colocate with or rebuild other facilities demonstrates the positive results of its endeavors. The commission therefore found that East Kentucky Power Cooperative had conducted an acceptably thorough review of alternative line locations under the circumstances.

Having found that the survey of alternative locations was reasonable and adequate, the commission had to decide if the applicant's choice of locations was reasonable. This case established a two-step analysis to determine whether there is wasteful duplication. PSC first looks at whether the applicant has conducted a thorough review of all reasonable alternatives. If that threshold is met, PSC considers whether the applicant's choice of the proposed location was reasonable.

The commission had some concerns about how the EPRI-GTC method operated. The method was developed for Georgia and does not recognize some of the geographic factors peculiar to

Kentucky that should play a role in transmission line siting here. The commission did not believe that the failure of the EPRI-GTC method to be Kentucky-specific at that time should lead the commission to reject the application.

PSC Case No. 2005-00089 (Rehearing of First Rowan Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Rowan County

Applied September 12, 2005
Decided November 9, 2005

The CPCN was denied because East Kentucky Power Cooperative failed to conduct a thorough review of all reasonable alternative routes, including the use of existing rights-of-way, so PSC could not determine if the proposed route would create a needless duplication of facilities.

East Kentucky Power Cooperative asked for a rehearing of the first Rowan case, arguing that under the standard established in 1952 in *Kentucky Utilities Company v. Public Service Commission*, PSC may only consider cost when addressing the issue of duplication of facilities. PSC disagreed and said the 1952 case must be interpreted in light of the 2004 amendments to KRS 278.020. PSC argued that in both the original Rowan PSC case and this rehearing, East Kentucky Power Cooperative had not provided evidence of a thorough review of all reasonable alternative routes.

PSC Case No. 2005-00467 and Case No. 2005-00472 Consolidated

Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties (Case No. 2005-00467); and
Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of alternative transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties (Case No. 2005-00472)

Applied December 22, 2005
PSC issued an order consolidating the two applications on January 6, 2006
Decided May 26, 2006

The CPCN was granted in Case No. 2005-00467 because the chosen route did not constitute unnecessary or wasteful duplication of facilities and there was a need. The case for the alternate route was dismissed as moot because the preferred route was granted.

To meet the part of the two-step process provided in the Warren case requiring the applicant for a CPCN to conduct a thorough review of all reasonable alternatives routes, the applicants attempted to identify all electrically feasible routes, including routes that used colocation. They identified 1,203 feasible routes and used the EPRI-GTC methodology to analyze the routes.

The commission found that this process met the requirement of a comprehensive survey of all potential routes. The utility developed a study area of approximately 600 square miles, evaluating more than 1,200 routes using a range of colocation of less than 50 percent to nearly 100 percent. This process for evaluation and selection of alternative routes was reasonable. Several intervenors argued that the utilities' evaluation focused on their chosen route from the beginning and the analysis was insufficiently comprehensive. The commission saw no basis for believing the utilities could not conduct a comprehensive survey in the time taken, and no intervenor offered testimony showing otherwise.

The intervenors questioned the utilities' decision not to use the full EPRI-GTC method. The commission had approved that method in other cases, including the Warren case. The applicants said they did not use the EPRI-GTC macro-corridor identification tool because the commission raised concerns about its use in the Warren case, plus the full EPRI-GTC method, which includes the macro-corridor portion, had not been calibrated for use in Kentucky at that time.

Under these conditions, the commission did not fault Louisville Gas and Electric Company and Kentucky Utilities Company for substituting their own alternative route survey analysis for the macro-corridor portion of the EPRI-GTC method. The commission clarified that it supported the use of the full EPRI-GTC method, including the macro-corridor portion, once it had been calibrated for use in Kentucky. That said, if any applicant believed wholesale application of the method limited the process such that the survey of potential routes was less than what the utility considered to be comprehensive, the utility should present an additional survey that included the routes the method excluded. In summary, a utility using the EPRI-GTC method should use the full method in future applications, but it should feel free to supplement the method's results if those results are less than comprehensive in consideration of potential routes. The commission was aware that the regulated Kentucky utilities and other interested parties were working to make the EPRI-GTC method more appropriate for use in Kentucky.

The intervenors questioned the utilities' use of their own "expert judgment." They argued that the EPRI-GTC method will generate certain results, which could then be overturned by management's contrary opinions. The commission recognized the usefulness of the EPRI-GTC method but did not advocate blind adherence to its results, recognizing the importance of utilities' expert judgment in the process.

PSC Case No. 2005-00458 (Second Rowan Case)

East Kentucky Power Cooperative's application for a CPCN to construct an electric transmission line in Rowan County

Applied December 8, 2005
Decided April 7, 2006

The CPCN was granted because East Kentucky Power Cooperative gave appropriate consideration to alternate routes and its consideration of all of the alternative line locations was comprehensive. The applicant acted reasonably in rejecting each of the alternatives. Construction of the proposed line would not result in wasteful duplication of facilities.

East Kentucky Power Cooperative submitted three preliminary routing options to the U.S. Forest Service and made those available to PSC. An interdisciplinary team within the Forest Service developed six alternate routes, which were made available to PSC. Three other routes were identified and examined by East Kentucky Power Cooperative.

The focus at the hearing was on routes that could parallel the Kentucky Utilities Company's line. The commission found that East Kentucky Power Cooperative acted reasonably in rejecting the alternatives to its proposed route.

PSC Case No. 2007-00155

Kentucky Power Company's application for a CPCN to construct a transmission line in Floyd County

Applied May 15, 2007
Decided August 3, 2007

The CPCN was granted because the utility established a need for the line and engaged in an adequate review of alternative routes. The line did not create a needless duplication of facilities.

Issue 3: PSC reviews the exact route of a new transmission line, not just the corridor.

PSC Case No. 2003-00380

An investigation of the proposed construction of transmission facilities in Mason and Fleming Counties by East Kentucky Power Cooperative

Decided December 30, 2003

The CPCN was granted because East Kentucky Power Cooperative's project could not reasonably use existing facilities or rights-of-way, it did not constitute wasteful duplication, and its decision to pursue the project was reasonable.

This case took place before the 2004 amendments to KRS 278.020. PSC held an investigation on its own motion because it had received so many letters from the public and from local officials, as well as a petition from residents.

The commission noted that it lacked the authority to affect the precise siting of the proposed facilities and did not identify routing or siting issues as relevant in its consideration of the project. It addressed the need for the proposed transmission project, the alternatives considered, and the reason those alternatives were not selected.

PSC Case No. 2005-00089 (First Rowan Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Rowan County

Applied April 21, 2005
Decided August 19, 2005

The CPCN was denied because the proposed route did not adequately consider the use of existing rights-of-way and transmission lines and corridors, so it violated the *Kentucky Utilities Company v. Public Service Commission* standard for absence of wasteful duplication of facilities.

PSC alluded to the issue by noting that it is the commission's obligation to consider and make findings on the issue of the "cluttering of the land with poles and wires." Here, the commission found that creating a new corridor through the Daniel Boone National Forest for the construction of a transmission line would result in a wasteful duplication of facilities due to the existence of an alternative route that was slightly more costly but would use existing rights-of-way.

PSC Case No. 2005-00089 (Rehearing of First Rowan Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Rowan County

Applied September 12, 2005
Decided November 9, 2005

The CPCN was denied because East Kentucky Power Cooperative failed to conduct a thorough review of all reasonable alternative routes, including the use of existing rights-of-way, so PSC could not determine if the proposed route would create a needless duplication of facilities.

East Kentucky Power Cooperative argued that PSC had no authority to look at the route and location in an application for a transmission line CPCN.

PSC responded by referring to the Statement of Consideration Relating to 807 KAR 5:120, paragraph 8 of the Summary of Comments and Responses in which the commission had rejected that assertion, citing legislative proceedings showing the General Assembly's intent that they consider those questions (Commonwealth of Kentucky. Public. *Statement*). PSC said that 807 KAR 5:120 was approved through the rulemaking process, no party appealed, and the commission did not believe the process should be reopened.

Issue 4: There are restrictions on moving the centerline after a CPCN has been issued.

PSC Case No. 2005-00207 (Warren Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Barren, Warren, Butler, and Ohio Counties

Applied July 1, 2005
Decided October 31, 2005

The CPCN was granted because under the circumstances of this case, East Kentucky Power Cooperative had conducted an acceptably thorough review of alternative line locations, and the commission concluded that the applicant's choice of a location for the line was reasonable.

Through its decision in this case, the commission established the rule that a utility may move the centerline of an approved transmission line 500 feet in either direction after approval as long as 1) the move does not shift the line or its right-of-way onto the property of a different landowner and 2) the property owner who is subject to the move agrees in writing to the requested move. Any changes greater than this distance, or ones that involve other landowners, will require the utility to return to the commission.

PSC Case No. 2005-00467 and Case No. 2005-00472 Consolidated

Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties (Case No. 2005-00467); and
Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of alternative transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties (Case No. 2005-00472)

Applied December 22, 2005
PSC issued an order consolidating the two applications on January 6, 2006
Decided May 26, 2006

The CPCN was granted in Case No. 2005-00467 because the chosen route did not constitute unnecessary or wasteful duplication of facilities and there was a need. The case for the alternate route was dismissed as moot because the preferred route was granted.

This case added to the rule established in Case No. 2005-00207: If a landowner refuses to consent in writing to a move of the line and the move otherwise meets all the conditions set out in that case, then a utility may move to reopen the proceedings for the limited purpose of presenting the proposed alteration, and the landowner's refusal to consent, to the commission.

Issue 5: There is no designated order in which a CPCN and permits from other agencies are obtained.

PSC Case No. 2005-00142

Joint application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties

Application May 11, 2005
Decided September 8, 2005

The CPCN was denied because the applicants' study of alternative routes was not sufficiently comprehensive to determine whether the proposed line would result in wasteful duplication of facilities. Specifically, they failed to adequately consider the use of existing rights-of-way, transmission lines, and corridors.

The intervenors argued that the application was premature because all environmental, historical, and other required assessments were not complete. They argued that the commission should not consider this application until the company had obtained all other necessary permits. The commission found no support in KRS 278.020 for this position. The order in which utilities apply for the different approvals is at their discretion. Under the wording of KRS 278.020, the commission found that it does not have the authority to require the company to obtain any other permits before filing its application with PSC.

PSC Case No. 2005-00207 (Warren Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Barren, Warren, Butler, and Ohio Counties

Applied July 1, 2005
Decided October 31, 2005

The CPCN was granted because under the circumstances of this case, East Kentucky Power Cooperative had conducted an acceptably thorough review of alternative line locations, and the commission concluded that East Kentucky Power Cooperative's choice of a location for the line was reasonable.

Intervenors argued that the utility was obligated to satisfy the requirements of federal laws such as the National Historic Preservation Act and National Environmental Policy Act before applying for a CPCN. They argued that an applicant must submit the assessment concurrent with the design of the project, which is the selection of the transmission line route.

The commission disagreed, saying that it does not have authority to dismiss or continue an application for a CPCN simply because an applicant has not received permits from the appropriate federal agencies. The commission should issue rulings based on a consideration of only those issues over which it has jurisdiction. If other agencies subsequently issue conflicting decisions, the applicant must decide how to proceed to resolve the conflicts.

Issue 6: It is not within PSC's scope to decide whether the time frame violates intervenors' due process rights.

PSC Case No. 2005-00142

Joint application of Louisville Gas and Electric Company and Kentucky Utilities Company for the construction of transmission facilities in Jefferson, Bullitt, Meade, and Hardin Counties

Application May 11, 2005
Decided September 8, 2005

The CPCN was denied because the applicants' study of alternative routes was not sufficiently comprehensive to determine whether the proposed line would result in wasteful duplication of facilities. Specifically, they failed to adequately consider the use of existing rights-of-way, transmission lines, and corridors.

The intervenors argued that they had been denied due process because of the truncated schedule in this case, specifically the deadline for filing testimony. PSC said the deadlines in the procedural schedule are dictated by the requirement in KRS 278.020(8) that the commission must issue a final decision in no more than 120 days.

PSC Case No. 2005-00207 (Warren Case)

East Kentucky Power Cooperative's application for a CPCN to construct a transmission line in Barren, Warren, Butler, and Ohio Counties

Applied July 1, 2005
Decided October 31, 2005

The CPCN was granted because under the circumstances of this case, East Kentucky Power Cooperative had conducted an acceptably thorough review of alternative line locations, and the commission concluded that the applicant's choice of a location for the line was reasonable.

One intervenor said that the short time frame to prepare the case was an infringement on her due process. She had only a few weeks to prepare and obtain expert assistance, whereas the utility had more than 2 years. This was not addressed in PSC's Final Order.

Chapter 4

Siting Methods for Electric Transmission Lines

Typically, the siting of a transmission line usually begins with a design team plotting the beginning and ending points of the proposed line on topographic maps and then connecting those points with a straight line. The team then adjusts the line around features that might cause lengthy permitting delays. The team develops several routes, checks them by doing field work, and picks the consensus best route. Affected property owners are identified and invited to attend a public meeting about the route.

The siting of a transmission line usually begins with a design team plotting the beginning and ending points of the proposed line on topographic maps and then connecting those points with a straight line. The team adjusts the line around features that might cause lengthy permitting delays, such as cities, airports, or military bases; or where line construction would adversely impact sensitive cultural or environmental resources such as archaeological sites, historic houses, or wetlands.

After developing several potential routes, the team checks the map accuracy of these data in the field and visually inspects the feasibility of each route. If the team finds features or obstacles that were not identified on the topographic maps, such as new construction or a road crossing, it adjusts the line accordingly. The team then reaches a consensus on which route is best.

The industry has developed computer-based models that systematically identify transmission routes that have the least impact on surrounding landscapes and that result in more logical and defensible siting decisions.

A corridor ranging in width from ½ half mile to 1 mile is superimposed over the selected route and property owners within this area are identified using information from the local property valuation office. Prior to the revision of KRS 278.020 in 2004, some transmission owners invited all landowners within the corridor to attend a public meeting. Other companies moved directly into contacting landowners for the purpose of acquiring right-of-way.

The method developed by the Electric Power Research Institute (EPRI) and Georgia Transmission Corporation (GTC) is the best-known of these new systems. The method begins by identifying a large area that contains parcels that are most suitable for the construction of a transmission line based on set criteria. Increasingly detailed information is added about each land parcel as the method moves through successive stages and as more and more refined routes are identified. Siting specialists from the transmission line owners use their judgment to choose from among the routes that are highest rated based on the method.

This method is based on expert judgment and interpretation. Critics have argued that it does not consider the perspective of external stakeholders. Partly in response to such criticisms, the industry has developed computer-based models that systematically identify transmission routes that have the least impact on surrounding landscapes and that result in more logical and defensible siting decisions.

The method developed by the Electric Power Research Institute and Georgia Transmission Corporation is the best known of these new systems. The method begins by identifying a large area of the landscape that contains land parcels that are most suitable based on set criteria for the construction of a proposed transmission line. Increasingly detailed information is added about each land parcel as the method moves through successive stages and as more refined routes are identified. The process ends with the

identification of specific routes. Siting specialists from the transmission owners use their judgment to choose from among the routes that are highest rated based on the method. If the information used in the method is accurate, the method results in alternatives that were developed in a consistent manner based on set criteria. Because Kentucky's version of the method has the potential to significantly affect how lines are sited in Kentucky, the EPRI-GTC method is described in some detail below.

The EPRI-GTC Method

In 2002, the Electric Power Research Institute and Georgia Transmission Corporation examined GTC's existing siting procedures for overhead transmission lines to see if improvements were possible. Among the more serious problems they found was the tendency for preferred routes to adversely affect sensitive biological resources, cultural properties, and proposed developments.

The EPRI-GTC research team created new procedures to solve these problems and to ensure that siting decisions were consistent, quantitative, and defensible. Their combined use of Geographic Information System (GIS) technology, statistical evaluation methods, and collaboration with stakeholders set new standards for examining large amounts of data, articulating explanations, and demonstrating logical connections between facts and selected transmission line routes.

The EPRI-GTC method is a well-defined, three-phase process in which each successive phase produces a more refined transmission line corridor. The phases are 1) macro corridor generation, 2) alternative corridor generation, and 3) alternative route analysis and evaluation.

Phase 1: Macro Corridor Generation

Phase 1 of the EPRI-GTC model generates a digital map representing a relatively large geographical area. This macro corridor contains the most suitable land for routing an overhead transmission line between two known points. Geographic Information System technology aids in identifying this area by analyzing satellite imagery and other available digital data to find corridors that minimize adverse impacts to the built and natural environments.

Phase 1 generates a digital map representing a relatively large geographical area. This macro corridor contains the most suitable land for routing an overhead transmission line between two known points. GIS technology aids in identifying this area by analyzing satellite imagery and other available digital data to find corridors that minimize adverse impacts to the built and natural environments.

Macro corridor generation begins by constructing a GIS database from a variety of geo-spatial data at a resolution of 98.4 feet (30 meter) grid cells. The beginning and ending points of the

proposed transmission line are determined. Landsat satellite imagery, digital elevation models, statewide road maps, and maps showing existing overhead transmission lines are used to classify cells into specific land cover classes such as urban or open land.

The EPRI-GTC team also identified "avoidance areas" for Phase 1, which are locations where transmission routes would be prohibited by physical barriers or administrative regulations or locations where significant permitting delays could be expected. Phase 1 avoidance areas are

- airports;
- military facilities;
- national and state parks;
- nonspannable water bodies;
- national wildlife refuges;
- mines and quarries;
- wild and scenic rivers;
- U.S. Forest Service wilderness areas;
- U.S. Environmental Protection Agency's Superfund sites;
- sites of ritual importance; and
- the following areas listed by the National Register of Historic Places:
  - historic structures,
  - historic districts,
  - archaeology sites, and
  - archaeology districts (Electric Power Research Institute 2-5, 2-7).

GIS software views each data set as a separate map, or data layer. There is a map showing the beginning and ending locations of the proposed transmission line, a map detailing land use based on satellite imagery, a digital elevation map, a road map, a map showing existing transmission lines, and a map displaying all avoidance areas.

These data layers can be thought of as a series of maps stacked one on top of the other, but because each is geographically referenced to a real place on the earth's surface, GIS software can analyze spatial relationships between them. For example, the software has the ability to determine that the end point of the proposed transmission line is located in an agricultural field (land-use data layer) that has a 5 percent slope (Digital Elevation Model data layer), and that while there are no existing transmission lines in the vicinity, there is a secondary road nearby and that an archaeological site eligible for the National Register for Historic Places is located less than 60 meters away.

Weights and Macro Corridor Scenarios. The EPRI-GTC team reached a consensus on how suitable each land cover class was for the construction of a transmission line. Assigned values ranged from 1, which is most suitable, to 9, which is least suitable. Numbers between 1 and 9 represent intermediate degrees of suitability in the following fashion:

- Areas of high suitability (1, 2, and 3) should be suitable for the macro corridor because they do not contain any known sensitive resources or physical constraints.
- Areas of moderate suitability (4, 5, and 6) contain resources or land uses that are moderately sensitive to disturbance or that present a moderate physical constraint to line construction and operation. Resource conflicts or physical constraints in these areas generally can be reduced or avoided using standard mitigation measures.
- Areas of low suitability (7, 8, and 9) would require special design measures because they contain resources that present a significant adverse impact that cannot be readily mitigated.

Avoidance areas are blocked to eliminate the possibility of the proposed corridor from crossing places that internal or external stakeholders identified as requiring maximum protection.

Once all grid cells on each of the data layers are assigned suitability values, a new composite map is created from them. Each grid cell on this new composite map is assigned a suitability value that is the average of the associated underlying data layers. For example, if the grid cell containing the transmission line end point has a suitability score of 5 on the land use data layer, a score of 1 on the digital elevation model data layer, a score of 1 on the road map data layer, and a score of 5 on the existing transmission line map, the resulting score on the composite suitability map for this particular grid cell would be 3 (5+1+1+5=12, which is divided by 4, the number of layers). Cells on the composite map with small values are more suitable for transmission line construction than are cells with larger values.

The EPRI-GTC team created a composite suitability map for each of the following siting scenarios:

- rebuilding existing transmission lines or building lines parallel to existing transmission lines,
- building a line parallel to existing road rights-of-way, and
- crossing undeveloped land.

Table 4.1 lists the land cover classes and indicates the suitability values for the three scenarios.

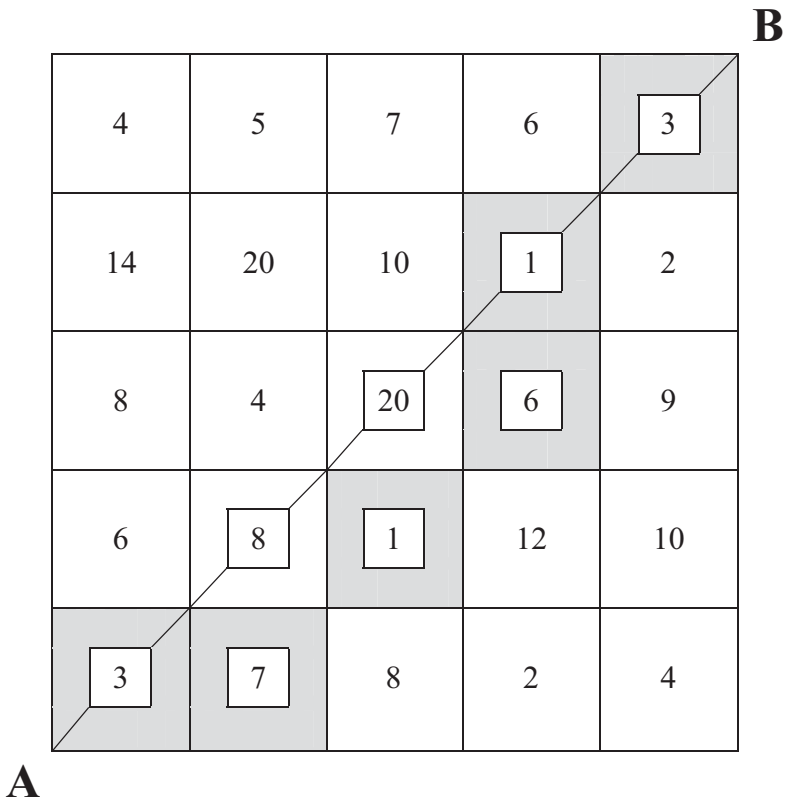
Table 4.1
Suitability Values for Different Macro Corridor Land Cover Classes

Land Cover Class	Suitability Values To		
	Rebuild Existing Line or Build Parallel to Existing Line	Build Parallel to Existing Roads	Cross Undeveloped Land
Open water	7	7	7
Secondary roads	5	1	5
Other utility corridors	5	5	5
Urban	9	9	9
Open land	2	2	1
Surface mining/rock outcrop	9	9	9
Forest	2	2	1
Agriculture	2	2	1
Wetland	9	9	9
Transmission corridors	1	5	5
Primary roads	5	1	5
Interstate	9	9	9
Slopes >30 degrees	9	9	9

Note: 1=most suitable, 9=least suitable.
Source: Electric Power Research Institute 2-7

After a composite suitability map is created for each of the three siting scenarios, the macro corridor GIS model uses a least-cost path algorithm to calculate all possible routes between the beginning and ending points of the proposed transmission line. Figure 4.A shows a hypothetical composite suitability surface for a proposed transmission line that will go from point A to point B.

Figure 4.A
Calculating the Least-cost Path Across a Hypothetical Composite Suitability Surface



Note: The number in each cell is the suitability value for the cell, the lower the number the more suitable the area is for a transmission line from point A to point B. Shaded cells represent the least-cost path.
Source: Adapted from Electric Power Research Institute 2-9.

The cumulative value of the suitability scores for any particular path is a function of the number of cells included in that path, which measures the length of the proposed line, and the suitability values associated with those cells. For example, the most direct path from A to B in the figure is through the cells indicated by the diagonal line. The cumulative suitability value for this path is 35 (3+8+20+1+3). The path from A to B indicated by the shaded squares in the figure is longer but has the lower, and thus better, cumulative suitability value of 21 (3+7+1+6+1+3). This is the least-cost path for a transmission line given the suitability values of the areas in this example. Any other path would have a higher cumulative value.

The cumulative suitability values for all possible paths are then sorted from lowest to highest, and the first 5 percent are selected to represent the macro corridor for that map.

The final step in Phase 1 is to combine the macro corridor for each of the three siting scenarios into a single composite map. The boundary of this composite macro corridor delineates the study project area and represents the best 5 percent of all possible land across which to route an overhead electric transmission line.

Phase 2: Alternative Corridor Generation

In Phase 2 of the model, four alternative corridors within the macro corridor are created. Each alternative seeks to minimize impacts to specific aspects of the surrounding landscape; therefore, each takes a slightly different perspective. These are the built environment perspective, which protects people, places, and cultural resources; the natural environment perspective, which protects water resources, plants and animals; the engineering requirement perspective, which minimizes costs and schedule delays; and the simple combined perspective, which is a composite of the built, natural, and engineering perspectives.

Phase 2 generates four alternative corridors within the composite macro corridor. Each alternative seeks to minimize impacts to specific aspects of the surrounding landscape; therefore, each takes a slightly different perspective. These are

- the built environment perspective, which protects people, places, and cultural resources;
- the natural environment perspective, which protects water resources, plants, and animals;
- the engineering requirement perspective, which minimizes costs and schedule delays; and
- the simple combined perspective, which is a composite of the built, natural, and engineering perspectives.

Alternative corridor generation begins by merging high-resolution aerial photographs that show objects in their exact ground positions, and other available digital data with the existing GIS database. These additional data allow for more accurate assessment of land use at a resolution of 15 feet (4.57 meters) grid cells.

The alternative corridor GIS database contains three different tiers, plus avoidance areas. Tier 1 features are items that EPRI-GTC and other stakeholders agreed were important to transmission line siting. Tier 2 data consist of related features that are grouped into categories, or data layers. Tier 3 data are data layers that have been grouped into the three perspectives: built environment, natural environment, and engineering requirements. Finally, the EPRI-GTC team identified more avoidance areas that represent either significant barriers to construction or areas stakeholders identified as requiring maximum protection. In addition to the avoidance areas from Phase 1, Phase 2 avoidance areas are historic districts eligible for the National Register of Historic Places, buildings and buffers, K-12 school parcels, daycare parcels, church parcels, cemetery parcels, wildlife refuges, and county and city parks (Electric Power Research Institute 2-16).

Tier 1 features have been calibrated by stakeholders so that all are measured on a suitability scale ranging from 1 to 9, with 1 being most suitable and 9 being least suitable. This ensures that features

measured in different units, such as building density and proximity to buildings, are directly comparable.

Stakeholders assigned a percentage weight to each Tier 2 data layer that reflected the consensus view of how important such variables are in the siting process. For example, within the built environment perspective, stakeholders felt that building density was the most significant variable to consider and therefore assigned it a weight of 37.4 percent. Spannable lakes and ponds were of less importance and were assigned a lower weight of 3.8 percent. Table 4.2 lists the final calibration for features (Tier 1) and the weightings of layers (Tier 2) that were used for the EPRI-GTC method.

Individual data layers are combined to form three distinct Tier 3 perspectives: the built environment, the natural environment, and engineering requirements. Within each perspective, data layers in that group are emphasized, but data layers from other perspectives must also be included.

With the database set up this way, when the least-cost path algorithm is run, it is working across a composite surface that is composed of averaged suitability scores for various features (Tier 1) that are grouped into weighted classes (Tier 2) and emphasizing a particular perspective by giving that perspective five times more weight than the other two perspectives.

The built environment, natural environment, engineering requirement, and simple combined perspectives produce a set of distinct alternative corridors that are evaluated and compared prior to developing alternative routes. The weighted data layers are combined to create a perspective that reflects the "optimal path" for each alternative corridor. This optimal path is the most suitable route because it receives the lowest score, representing the route with the least impact considering the perspective.

Table 4.2
EPRI-GTC Method: Final Calibration for Features and Weightings of Layers

Built Environment Perspective		Natural Environment Perspective		Engineering Perspective	
Proximity to Buildings (11.5%)		Flood Plain (6.2%)		Linear Infrastructure (48.3%)	
Background	1	Background	1	Rebuild existing lines	1
900-1,200 feet	1.8	100-years floodplain	9	Parallel existing lines	1.4
600-900 feet	2.6	Streams/Wetlands (20.9%)		Parallel roads ROW	3.6
300-600 feet	4.2	Background	1	Parallel gas pipelines	4.5
0-300 feet	9	Streams less than 5 cfs + regulatory buffer	5.1	Parallel railway ROW	5
Eligible Nat. Register of Historic Places Historic Structures (13.9%)		Nonforested noncoastal wetlands	6.1	Background	5.5
Background	1	Rivers/streams greater than 5 cfs + regulatory buffer	5.1	Future Ga. Dept. of Transportation Plans	8.1
900-1,200 feet	2.8	Nonforested coastal wetlands	8.4	Road ROW	8.4
600-900 feet	3.6	Trout streams (50' buffer)	8.5	Scenic highways ROW	9
300-600 feet	5.2	Forested wetlands + 30 ' buffer	9	Slope (9.1%)	
0-300 feet	9	Public Lands (16.0%)		0-15%	1
Building Density (37.4%)		Background	1	15-30%	5.5
0-0.5 buildings/acre	1	WMA–not state owned	4.8	Greater than 30%	9
0.5-0.2 buildings/acre	3	Other conservation land	8.3	Intensive Agriculture (42.6%)	
0.2-1 building/acre	5	U.S. Forest Service	8	Background	1
1-4 buildings/acre	7	WMA–state owned	9	Fruit orchards	5
4-25 buildings/acre	9	Land Cover (20.9%)		Pecan orchards	9
Proposed Development (6.3%)		Open land, pastures, scrub/shrub, etc.	1	Center pivot agriculture	9
Background	1	Managed pine plantations	2.2		
Proposed development	9	Row crops and horticulture	2.2		
Spannable Lakes and Ponds (3.8%)		Developed land	6.5		
Background	1	Hardwood/natural coniferous forests	9		
Spannable lakes and ponds	9	Wildlife Habitat (36.0%)			
Land Divisions (8.0%)		Background	1		
Edge of field	1	Habitat for species of concern	3		
Land lots	7.9	Natural areas	9		
Background	9				
Land Use (19.1%)					
Undeveloped	1				
Nonresidential	3				
Residential	9				

Note: ROW=right-of-way, cfs=cubic feet per second, WMA=wildlife management area.
The suitability scale ranges from 1 (most suitable) to 9 (least suitable). The weightings of the variables (shaded cells) add to 100% within each perspective.
Source: Electric Power Research Institute 2-19.

Phase 3: Alternative Route Analysis and Evaluation

In Phase 3, Geographic Information System modeling is used to facilitate discussion among electric transmission experts as they select a preferred route and alternative routes.

In Phase 3, GIS modeling is used to facilitate discussion among electric transmission experts as they select a preferred route and alternative routes. Before this process begins, additional grid cells must be added to the alternate corridors generated during Phase 2 until the width of the right-of-way is appropriate for the voltage of the proposed project. These expanded corridors become the alternative routes from which the project team will select.

Additional data are then added to the GIS database for each grid cell within the alternative routes. These data include detailed information such as property lines and types of buildings. Waiting until the final stages of the modeling process to collect such detailed data saves time and money.

Team specialists from engineering, land acquisition, environmental, and other departments then evaluate the advantages and disadvantages of each alternative route. GIS provides a variety of ways to view the relevant data, such as summary tables, spreadsheets, graphic illustrations, or interactive queries. Among other criteria, a simple query can tell specialists how many residences will have to be relocated for a particular route, how many miles of line will pass through environmentally sensitive areas, and how close the line comes to schools or highly populated areas.

The project team then derives a relative score for each alternative route. These scores are combined for the built perspective, natural environment perspective, and the engineering perspective and then totaled to give an overall score. These numeric scores provide an objective reference for comparing alternative routes.

The final step in the evaluation process applies expert judgment for ranking the top alternative routes. Each siting team member ranks the top-scoring routes based on visual concerns, community concerns, risk of schedule delay, special permit issues, and construction and maintenance accessibility. These considerations are assigned weights that can vary from project to project, and individual responses are combined for an overall team ranking and selection of the preferred route and alternative routes.

The Kentucky Transmission Line Siting Model

East Kentucky Power Cooperative and E.ON U.S. sponsored a workshop in February 2006 to adapt the EPRI-GTC model for use in Kentucky. The workshop included local utility companies, Geographic Information System specialists, developers of the original EPRI-GTC method, and other stakeholders.

East Kentucky Power Cooperative and E.ON U.S. sponsored a workshop in February 2006 to adapt the EPRI-GTC method for use in Kentucky. The workshop included local utility companies, GIS specialists, most of the team members who developed the original EPRI-GTC method, and other stakeholders. Table 4.3 has the list of represented organizations.

Table 4.3
Organizations Represented at Workshop To Adapt EPRI-GTC Method for Use in Kentucky

American Electric Power	Kentucky Geological Survey
Big Rivers Electric Corporation	Kentucky Heartwood
Cinergy Corporation	Kentucky Heritage Council
City of Lexington	Kentucky League of Cities
City of Somerset	Kentucky Nursery and Landscape Association
Columbia Gas Transmission	Kentucky Office of the Attorney General
E.ON U.S.	Kentucky Public Service Commission
East Kentucky Power Cooperative	Kentucky Resources Council/Kentuckians for the Commonwealth
Fayette County Neighborhood Council	
Kentucky Cabinet for Economic Development	Kentucky State Nature Preserves Commission
	Kentucky Transportation Cabinet
Kentucky Chapter of the Sierra Club	Office of State Archaeology
Kentucky Department of Fish and Wildlife Resources	Preservation Kentucky
	U.S. Department of Defense
Kentucky Division of Conservation	U.S. Fish and Wildlife Service
Kentucky Division of Water	U.S. Forest Service
Kentucky Farm Bureau	

Source: Photo Science D12, D13.

The workshop began by dividing the participants into three groups, one for each of the three siting perspectives: built environment, natural environment, and engineering. Each group was given a slightly modified version of the EPRI-GTC siting criteria and was asked to discuss whether modification was needed for use in Kentucky.

After each group reached a consensus regarding which variables should be included in the Kentucky siting model, the process

began of calibrating those variables with respect to their relative suitability for siting electric transmission lines. Each participant first assigned a suitability value to each variable. The group then discussed the various perspectives regarding why certain variables were more or less suitable. After discussion, the participants again assigned suitability values, and the process was repeated until the facilitator determined that the group was as close as possible to reaching a consensus on the relative importance of the various variables in each GIS layer.

Once the relative suitability of each variable was determined, stakeholders began determining the relative importance of each criterion, or layer, in the siting process. A consensus was reached regarding the importance of each in the siting process, which was expressed as a percentage. Layers with higher percentages were considered more important in the siting process than layers that received a lower percentage. For comparison to the EPRI-GTC method, Tables 4.4 and 4.5 list avoidance areas and the final calibration for features (Tier 1) and the weightings of layers (Tier 2) as derived for the Kentucky Transmission Line Siting Model.

By the end of the workshop, participants had developed a list of variables they felt were significant to consider when siting a proposed transmission line. This list did not differ much from that used in the original EPRI-GTC method. Differences included the removal of variables from the EPRI-GTC list that were not applicable in Kentucky, such as pecan orchards; and the addition of variables that were Kentucky specific, such as horse farms.

By the end of the workshop, participants had developed a list of variables they felt were significant to consider when siting a proposed transmission line. This list did not differ much from that used in the EPRI-GTC method. Differences included the removal of variables from the EPRI-GTC list that were not applicable in Kentucky, such as pecan orchards, and the addition of variables that were Kentucky specific, such as horse farms.

Table 4.4
Kentucky Transmission Line Siting Model Avoidance Areas

Built Environment Perspective	Natural Environment Perspective	Engineering Perspective
Listed archaeology sites and districts	U.S. Environmental Protection Agency Superfund sites	Nonspannable water bodies
Listed National Register of Historic Places districts and buildings	State and national parks	Active mines and quarries
	U.S. Forest Service Wilderness Area	
City and county parks		Buildings
Day care parcels	Wild/scenic rivers	Airports
Cemetery parcels	Wildlife refuge	Military facilities
School parcels (K-12)	State nature preserves	Center pivot irrigation
Church parcels	Designated critical habitat	

Source: Photo Science G-17.

Table 4.5
Kentucky Model: Final Calibration for Features and Weightings of Layers

Built Environment Perspective		Natural Environment Perspective		Engineering Perspective	
Proximity to Buildings 16.8%		Floodplain 4.6%		Linear Infrastructure 86.2%	
Background	1	Background	1	Parallel existing transmission lines	1
900-1,200 feet	3.4	100-years floodplain	9	Rebuild existing transmission lines (good)	2.2
600-900 feet	5.7	Streams/Wetlands 29.2%		Background	4.4
300-600 feet	8	Background	1	Parallel interstates ROW	4.7
0-300 feet	9	Streams less than 5 cfs + regulatory buffer	6.2	Parallel roads ROW	5.4
Building Density 8.4%		Wetlands + 30 foot buffer	8.7	Parallel pipelines	5.6
0-0.5 buildings/acre	1	Outstanding state resource waters	9	Future state transportation plans	5.6
0.05-0.2 buildings/acre	3	Public Lands 17.7%		Parallel railway ROW	6.1
0.2-1 buildings/acre	5.6	Background	1	Road ROW	7.2
1-4 buildings/acre	8.5	WMA–not state owned	5.1	Rebuild existing transmission lines (bad)	8.6
More than 4 buildings/acre	9	U.S. Forest Service (proclamation area)	6.2	Scenic highways ROW	9
Proposed Development 3.9%		Other conservation land	7.8	Slope 13.8%	
Background	1	U.S. Forest Service (owned)	9	0-15%	1
Proposed development	9	State-owned conservation land	9	15-30%	4
Spannable Lakes and Ponds 4.0%		Land Cover 19.8%		30-40%	6.7
Background	1	Developed land	1	Greater than 40%	9
Spannable lakes and ponds	9	Agriculture	4.6		
Land Use 35.9%		Forests	9		
Commercial/Industrial	1	Wildlife Habitat 28.7%			
Agriculture (crops)	3.5	Background	1		
Agriculture (other livestock)	4.6	Habitat for species of concern	9		
Silviculture	6				
Other (forest)	6.7				
Equine agri-tourism	8				
Residential	9				
Proximity to Eligible Historic and Archaeological Sites 31.0%					
Background	1				
900-1,200 feet	4.6				
600-900 feet	7.9				
0-300 feet	8.6				
300-600 feet	9				

Note: ROW=right-of-way, cfs=cubic feet per second, WMA=wildlife management area.
The suitability scale ranges from 1 (most suitable) to 9 (least suitable). The weightings of the variables (shaded cells) add to 100% within each perspective.
Source: Photo Science G-17.

Given the potential usefulness of the Kentucky adaptation of the EPRI-GTC method, this report has three recommendations related to it.

Given the potential usefulness of the Kentucky adaptation of the EPRI-GTC method, this report has three related recommendations below.

The Kentucky Transmission Line Siting Model is complicated. If it is going be used increasingly in the selection of routes, interested members of the public should be able to have information on it that is understandable. This would be especially important for those who may wish to intervene in cases.

Recommendation 4.1

The Public Service Commission should make available as a document and on its Web site a primer on the workings of the Kentucky Transmission Line Siting Model.

It is important that the Kentucky model be updated periodically to take into account possible changes in priorities. There should be as much public participation as is feasible in determining the criteria to be included in the model and how criteria are weighted.

Recommendation 4.2

The Public Service Commission should work with Kentucky utility companies and others to ensure that the Kentucky Transmission Line Siting Model is updated periodically based on input from a diverse group of interested parties.

As does the EPRI-GTC method, the Kentucky siting model relies on a great deal of data. For example, if historic buildings and listed archaeology sites are to be avoided, there must be accurate data as to their locations. Using systematic criteria to choose routes is only useful if the data on which calculations are made are accurate.

Recommendation 4.3

The Public Service Commission should consider hiring a consultant to verify that data used in the Kentucky Transmission Line Siting Model are accurate and to create a plan to address any deficiencies found.

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Appendix A

Summary of Siting Board and Public Service Commission Electric Transmission Line Cases

Siting Board: Construction Certificates			
Case number	**2002-00149**	**2002-00150**	**2004-00351**
Applicant	Kentucky Mountain Power	Thoroughbred	Cincinnati Gas & Electric
County/counties	Knox	Muhlenberg	Campbell
Miles	25	20/9.7	4.9
Kilovolts	138	345/138	138
Cost of project	$33,000,000	$37,000,000	Unknown
Application administratively complete	June 13, 2002	Oct. 13, 2003	Oct. 21, 2004
Application review consultant	BBC Research and Consulting		MACTEC
–Project needed and feasible?	Yes	Yes	Yes
Case extended to 120 days?	No	No	Yes
Data requests to utility	Unknown		1
Protest letters			0
Intervenors (full)	1	4	0
Intervenors (limited)			0
Date of public hearing	None	Yes	None
Attendance		Unknown	
–Oral comments		Unknown	
–Written comments		Unknown	
Date of evidentiary hearing	Aug. 7, 2002	Nov. 10, 2003	
Siting Board's findings			
–Facility needed?	Yes	Yes	Yes
–Alternate routes considered?	n/a	n/a	Yes
–Preferred route is best?	Yes	Yes	Yes
–Duplicates existing facilities?	No	No	No
Date certificate granted	Sept. 5, 2002	Dec. 5, 2003	Jan. 14, 2005
Date certificate denied			
–Explanation			
Time to approve application	84 days	53 days	86 days
Request for rehearing filed	Yes		
Granted	Unknown		
Denied	Unknown		
–Explanation			

Public Service Commission: Certificate of Public Convenience and Necessity			
Case number	**2004-00320**	**2004-00365**	**2005-00089**
Utility	East Kentucky Power	Big Rivers	East Kentucky Power
County/counties	Spencer	Breckinridge, Meade	Rowan
Miles	6.3	17.3	6.9
Kilovolts	161	161	138
Cost of project	$2,589,000	$3,300,000	$4,900,000
Application administratively complete	Jan. 11, 2005	Nov. 15, 2004	April 21, 2005
Application review consultant	ICF Resources	Liberty Consulting Group	MSB Energy Associates
–Project needed and feasible?	Yes	Yes	Yes
Case extended to 120 days?	No	Yes	Yes
Data requests to utility	2	2	3
Protest letters	3	3	several
Intervenors (full)	0	1	1
Intervenors (limited)	0	0	0
Date of public hearing	March 3, 2005	Jan. 20, 2005	June 16, 2005
–Attendance	1	27	26
–Oral comments	0	7	7
–Written comments		1	2
Date of evidentiary hearing	March 8, 2005	Jan. 31, 2005	July 18, 2005
Commission's findings			
–Facility needed?	Yes	Yes	Yes
–Alternate routes considered?	Yes	Yes	Not fully
–Preferred route is best?	Yes	Yes	Not enough data
–Duplicates existing facilities?	No	No	Not enough data
Date certificate granted	March 30, 2005	Feb. 28, 2005	
Date certificate denied			Aug. 19, 2005
–Explanation			Insufficient study of alternate routes
Time to approve application	78 days	105 days	120 days
Request for rehearing filed			Sept. 13, 2005
Granted			
Denied			Nov. 9, 2005
–Explanation			Insufficient study of alternate routes

Public Service Commission: Certificate of Public Convenience and Necessity			
Case number	**2005-00101**	**2005-00142**	**2005-00154**
Utility	Kentucky Power	Louisville Gas & Electric, Kentucky Utilities	Kentucky Utilities
County/counties	Leslie	Jefferson, Bullitt, Meade, Hardin	Woodford, Anderson, Franklin
Miles	1.08	41.9	12.4
Kilovolts	161	345	138
Cost of project	$4,215,000	$59,100,000	$7,900,000
Application administratively complete	June 17, 2005	May 11, 2005	May 11, 2005
Application review consultant	Barrington-Wellesley Group	Liberty Consulting Group	Liberty Consulting Group
–Project needed and feasible?	Yes	Yes	Yes
Case extended to 120 days?	Yes	Yes	Yes
Data requests to utility	1	2	1
Protest letters	0	several	several
Intervenors (full)	0	2	1
Intervenors (limited)	0	1	0
Date of public hearing	None	July 12, 2005	July 5, 2005
–Attendance		114	45
–Oral comments		29	11
–Written comments		2	0
Date of evidentiary hearing	None	July 26, 2005	July 5, 2005
Commission's findings			
–Facility needed?	Yes	Yes	Yes
–Alternate routes considered?	Yes	No	Yes
–Preferred route is best?	Yes	Not enough data	Not enough data
–Duplicates existing facilities?	No	Not enough data	Not enough data
Date certificate granted	Sept. 19, 2005		
Date certificate denied		Sept. 8, 2005	Sept. 8, 2005
–Explanation		Insufficient study of alternate routes	Insufficient study of alternate routes
Time to approve application	94 days	120 days	120 days
Request for rehearing filed			
Granted			
Denied			
–Explanation			

Public Service Commission: Certificate of Public Convenience and Necessity			
Case number	**2005-00155**	**2005-00207**	**2005-00458**
Utility	Louisville Gas & Electric	East Kentucky Power	East Kentucky Power
County/counties	Trimble	Barren, Warren, Butler, and Ohio	Rowan
Miles	2.5	97.55	6.9
Kilovolts	345	161	138
Cost of project	$7,200,000	$43,840,000	$7,750,000
Application administratively complete	May 11, 2005	July 1, 2005	Dec. 8, 2005
Application review consultant	Liberty Consulting Group	ICF Resources	MSB Energy Associates
–Project needed and feasible?	Yes	Yes	Yes
Case extended to 120 days?	Yes	Yes	Yes
Data requests to utility	0	5	2
Protest letters	0	31	3
Intervenors (full)	0	6	1
Intervenors (limited)	0	0	0
Date of public hearing	None	Sept. 6, 2005	None
–Attendance		Approximately 175	
–Oral comments		Many	
–Written comments		12	
Date of evidentiary hearing	July 26, 2005	Sept. 13, 20, 21, 2005	Feb. 21, 2006
Commission's findings			
–Facility needed?	Yes	Yes	Yes
–Alternate routes considered?	Yes	Yes	Yes
–Preferred route is best?	Yes	Yes	Yes
–Duplicates existing facilities?	No	No	No
Date certificate granted	Sept. 8, 2005	Oct. 31, 2005	April 7, 2006
Date certificate denied			
–Explanation		Certificate later resolved as moot	
Time to approve application	120 days	120 days	120 days
Request for rehearing filed			
Granted			
Denied			
–Explanation			

Public Service Commission: Certificate of Public Convenience and Necessity			
Case number	**2005-00467/472**	**2006-00463**	**2007-00155**
Utility	Louisville Gas & Electric, Kentucky Utilities	East Kentucky Power	Kentucky Power
County/counties	Jefferson, Bullitt, Meade, Hardin	Clark, Madison, Garrard	Floyd
Miles	42.03/43.9	35.6	8.3
Kilovolts	345	345	138
Cost of project	$57,700,000	$38,400,000	$15,400,000
Application administratively complete	Jan. 27, 2006	May 22, 2007	May 15, 2007
Application review consultant	Liberty Consulting Group	Liberty Consulting Group	MSB Energy Associates
–Project needed and feasible?	Yes	Yes	Yes
Case extended to 120 days?	Yes	Yes	No
Data requests to utility	3	1	0
Protest letters		0	0
Intervenors (full)	36	0	1
Intervenors (limited)	3	1	0
Date of public hearing	March 6, 2006	Aug. 2, 2007	None held
–Attendance	109	Unknown	
–Oral comments	29	5	
–Written comments	Some	Unknown	
Date of evidentiary hearing	March 28, 2006	Aug. 22, 2007	None held
Commission's findings			
–Facility needed?	Yes	Yes	Yes
–Alternate routes considered?	Yes	Yes	Yes
–Preferred route is best?	Yes	Yes	Yes
–Duplicates existing facilities?	No	No	No
Date certificate granted	May 26, 2006, for Case 2005-00467	Sept. 19, 2007	Aug. 3, 2007
Date certificate denied	2005-00472 judged moot		
–Explanation			
Time to approve application	119 days	120 days	80 days
Request for rehearing filed	Yes		
Granted			
Denied	Jan. 30, 2007		
–Explanation	Statutory deadline passed		

Source: Compiled by Program Review staff from case files of the Siting Board and PSC.

Appendix B

Example of Public Notification to Property Owners

The documents in this appendix were part of East Kentucky Power Cooperative's mailing to property owners who could be affected by a line project proposed in 2006.

EAST KENTUCKY POWER COOPERATIVE

August 15, 2006

[NAME]
[ADDRESS]
[ADDRESS]

Dear [NAME],

Subject: Smith-West Garrard Transmission Line Project

East Kentucky Power Cooperative, Inc., (EKPC) soon will construct approximately 35 to 37 miles of 345-kilovolt transmission line between EKPC's Smith Station in southern Clark County and a new substation to be constructed west of Lancaster in Garrard County. This project will affect property owners in Clark, Garrard and Madison counties.

You are receiving this informational packet because data obtained from the county Property Valuation Administrator indicates you own property that could be affected by this project, and EKPC values your input on this important project.

EKPC would like to hear your comments about this project. You are invited to attend one of our open house meetings. Individuals owning property north and east of Ky. 595, like yourself, are encouraged to attend our open house at the **Best Western-Holiday Plaza located at 100 Eastern Bypass, Richmond, on Thursday, August 31, 2006, during the hours of noon to 7 p.m.**

If you are unable to attend on this date, EKPC also will be conducting another open house at Hyattsville Baptist Church, 1365 Richmond Road (Ky. 52), Lancaster, on Tuesday, August 29, 2006, during the hours of noon to 7 p.m.

The open house format is informal and there will not be any speeches. You will be able to talk one-on-one with people from EKPC who are involved with the project. You can attend any time during the scheduled hours of the open house so we can hear from you and exchange information. We will also be serving refreshments.

Enclosed are some informational materials about EKPC, our open house format and this specific project. You may want to read over these materials prior to our visit. Please make arrangements to drop by and talk with us. We look forward to meeting you.

Sincerely,

Bill Sharp, Right-of-Way Agent
Power Delivery—Expansion

Enclosures

SmWG_OH_PropertyOwnerLetterEast.doc

4775 Lexington Road 40391
P.O. Box 707, Winchester,
Kentucky 40392-0707
Tel. (859) 744-4812
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http://ww

A Touchstone Energy Cooperative

We want you to...
attend our open house.

Local property owners are encouraged to attend our Open House to help us gather information.

The Open House is a key way we keep property owners involved and informed every step of the way when building a transmission line.

Thank you for your cooperation as we work together.

We want you to...
know the project schedule.

1. Open Houses conducted	August 29 & 31, 2006
2. Corridor mapping/surveying	Fall 2006
3. Centerline established	Fall 2006
4. Right-of-way negotiations	Spring 2007
5. Design activity	Spring 2007
6. Structure stakeout	Spring 2008
7. Construction	2008 to Summer 2009

We want you to...
know who we are.

Winchester-based East Kentucky Power Cooperative is a not-for-profit electric utility that generates and transmits electricity to 16 Touchstone Energy Cooperatives across the state. A 17th cooperative, Warren RECC, will join the system in 2008. These cooperatives distribute the energy to about 1 million co-op customers. Our mission is not to make money, but to improve the quality of life of those we serve.

Here is other information about us:

What a cooperative is
A cooperative is a not-for-profit business that is owned and democratically governed by its members. A co-op exists solely to serve its members.

What "not-for-profit" means
A not-for-profit cooperative is in business for the public good rather than for the financial benefit of an individual owner or stockholders.

Why we build lines
Power lines are built to keep pace with the tremendous growth in Kentucky. Power lines transport electricity like roads carry traffic. If there is too much traffic on a power line, though, the line overloads and people lose power. We build lines to avoid that problem.

Why we can't bury lines
While burying lines is more pleasing to the eye and protects them from ice and weather, the costs of burying lines is prohibitive. Line repairs are also extremely difficult and time consuming. It can cost as much as 10 times more money to construct underground transmission lines.

The process we use to build lines
After the Open House we'll finalize a centerline for any new line section. Affected property owners will be notified. If you are affected, we will seek permission to conduct a survey to confirm the centerline. Negotiations then begin on a payment to affected landowners for the right to run the line across their land. Our goal is always to minimize costs and the impact upon you and your community.

How we choose line routes
We use an objective methodology and computer model developed to strike a balance between a number of factors, including community impacts, geography, environmental impacts and costs. The factors considered in the model were developed with public input and we are able to incorporate public input as we refine the route location.

continued on back

About rights of way

If your property is affected by this project, EKPC will seek to purchase an easement that allows the cooperative to locate its poles and wires on your property, and to enter the property as needed for maintenance. The property owner will continue to own and use the property. The easement allows EKPC to clear and control trees within the right-of-way, as well as other trees that could interfere with transmission lines, and prevents structures from being constructed in the right-of-way.

How we value property

We conduct a market analysis of the area based on recent property sales and assess the impact the line would have on any particular property.

How we work with property owners

Our professionals will work with you respectfully, and we will work closely with each property owner who is affected by any phase of the construction. It is our goal to make sure that property owners are well-informed about the project and have ample opportunity to discuss it with us.

What about environmental impacts?

Our biologists do extensive work prior to project construction in order to assess the environmental impact. The biologists work to ensure EKPC minimizes and avoids impacting endangered plants and animals during line construction.

How property owners and local communities provide input

The input of the community and affected property owners is of primary concern. We host open houses to share and gather information, and we strive to keep property owners and others fully informed about construction projects.

For this project, EKPC seeks input from affected property owners and concerned citizens during the regulatory process. In accordance with 36 Code of Federal Regulations Part 800 and the National Historic Preservation Act of 1966, as amended, East Kentucky Power Cooperative is soliciting the involvement of those who have a legal or economic relation to properties that will be affected by the proposed line or have a demonstrable interest in the historic built and/or archaeological environment in the project area. To become formally involved in the regulatory process as a consulting party, please send a letter, complete with contact information and statement of interest, to Joe Settles at joe.settles@ekpc.coop or at East Kentucky Power Cooperative, 4775 Lexington Road, Winchester, KY 40391.

We want you to...
be informed about this project.

About the Smith-West Garrard transmission line project.
This is a proposed project to construct a new transmission substation and approximately 35 to 37 miles of 345-kilovolt transmission line. The line will require 150 feet of right-of-way. On sections of the line where an existing line is rebuilt or parallelled, the amount of additional right-of-way could be less than 150 feet. This project will help EKPC to accommodate load growth in Central Kentucky and improve the reliability of the regional transmission grid.

Why does EKPC need to build this particular line?
This transmission line will provide an outlet for EKPC to deliver electricity from additional generating units being constructed at J.K. Smith Station in southern Clark County. It will also provide an additional north-south transmission corridor, which is critically needed to ensure the reliability of the regional transmission grid.

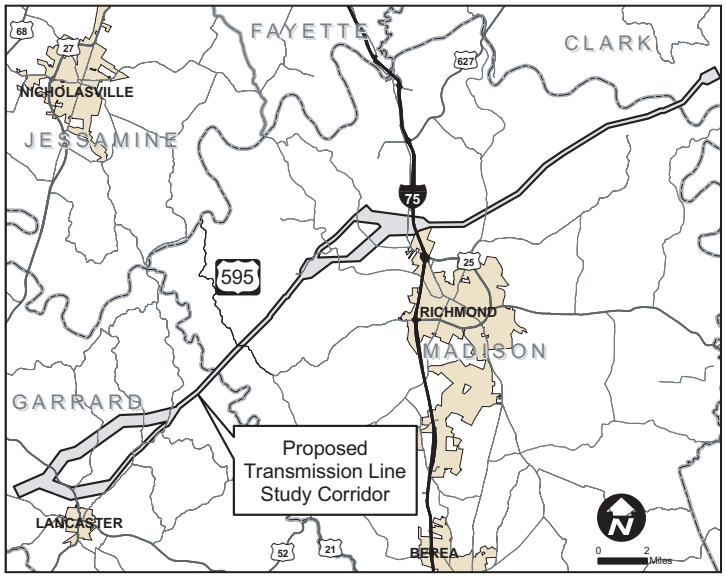
What approvals must be secured for this project?
The Kentucky Public Service Commission must grant a Certificate of Public Convenience and Necessity for this project to be constructed. The Rural Utilities Service, an agency that administers the U.S. Department of Agriculture's Rural Development Programs (USDA Rural Development), must ensure that EKPC meets appropriate environmental obligations including compliance with the National Environmental Policy Act and the National Historic Preservation Act.

We want you to...

know where the line will be located.

Where will the line be located?

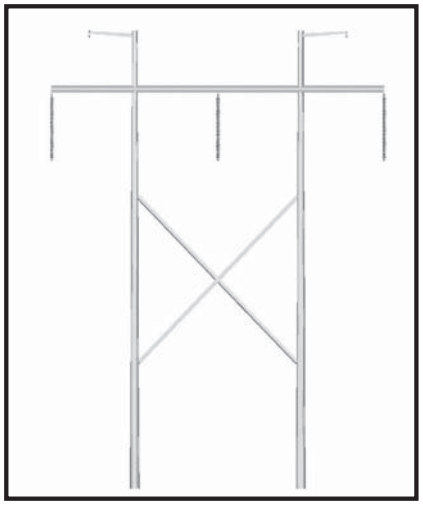
This transmission line will begin at EKPC's J.K. Smith Station in southern Clark County near the community of Trapp. It will extend through Madison and Garrard counties to a new switching station to be constructed west of Lancaster in Garrard County. This station will tie the new transmission line into an existing 345-kV transmission line owned by Kentucky Utilities.



We want you to...

know what the new line will look like.

This project will use H-frame pole construction. Below is a drawing of the typical structures that will be used for the project. EKPC plans to use steel poles for this project.



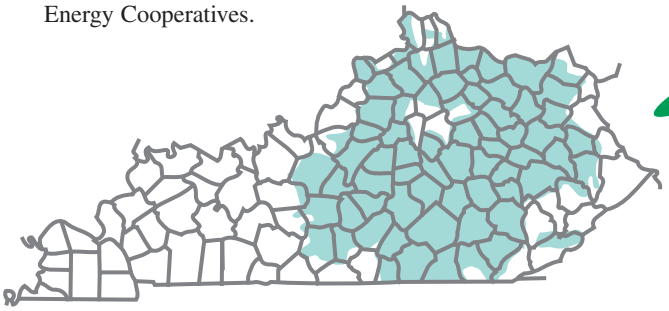
Typical H-Frame Pole

We want you to...

know about our system.

East Kentucky Power Cooperative Member Service area

EKPC is a not-for-profit generation and transmission utility with headquarters in Winchester. EKPC generates electric power and transports it to 16 locally-owned cooperatives that distribute it to 500,000 homes, farms, businesses and industries in 89 Kentucky counties. Warren RECC will become the 17th member-owner when it joins the system in 2008. Together, EKPC and member cooperatives are known as Kentucky's Touchstone Energy Cooperatives.



EAST KENTUCKY POWER COOPERATIVE

A Touchstone Energy Cooperative

Appendix C

Response From East Kentucky Power Cooperative

East Kentucky Power Cooperative, Inc.
LRC Committee Hearing – Transmission Line Siting
November 8, 2007 – Capital Annex, Room 131

Comments by:
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East Kentucky Power appreciates the opportunity to contribute to this research effort on the Siting of Transmission Lines. We especially want to commend the LRC Staff members for their thorough work and high level of professionalism. It was a pleasure to work with them during this important process.

We find the report to be thorough, factual and well balanced and we support the three recommendations related to making basic information about the EPRI/GTC Siting Methodology available to the public, the development of a plan to ensure that Kentucky Stakeholder input is updated at a practical interval, and to the initiation of an expert programmatic review of the available data for use in the EPRI/GTC Siting Methodology and models.

I would like to clarify remarks made this morning by PSC Executive Director, Elizabeth O'Donnell regarding stakeholder input and data used by the EPRI/GTC Siting Methodology and Model. The "inventory" of land use data changes from project to project as location changes – this data is retrieved initially from publicly available sources and later in the process from more site-specific examination. However, the weighting of features and land uses in the model for corridor generation does not change with project and location because it represents the relative value that Kentucky Stakeholders assign to the entire range of features. It is particularly important to maintain these values in transmission siting across the state to appropriately apply Stakeholder input and to strive for objectivity and consistency.

EKPC has two remaining concerns that are mentioned and outlined in the report, although the report did not include recommendation related to these issues.

1) First, there is a potential for a serious conflict to develop between the route adjustment limits typically issued by the PSC and the mitigation requirements that can be mandated by agencies administering the National Environmental Policy Act (NEPA) compliance. The situation can put companies who must comply with NEPA squarely between conflicting State and Federal Government requirements with no recourse or remedy. This applies primarily to EKPC, which, as an Rural Utilities Service (RUS) borrower, must satisfy NEPA on all transmission projects. But this situation could apply to any utility constructing a line where a federal action is involved.

2) Another issue we believe deserves attention is the guiding principles for transmission development in Kentucky. By necessity, the decision criteria used by the PSC has unfolded incrementally with each case, but it has been a tedious and costly process. Going forward, the development of some basic guidelines for transmission siting would be very useful for utilities, Commissioners, PSC consultants, the public, and affected property owners so that everyone can start with the same understanding about the objectives for transmission line siting in Kentucky. The EPRI/GTC methodology is an excellent way to compare physical features on the ground and apply comprehensive land use scoring to combine a comparative statistical analysis and professional judgment to find the least impactful route. The verification of data available to utilities suggested in the third recommendation should be a stabilizing influence for use of the model that we hope can eliminate a great deal of controversy. However, there are many overarching questions that are not related specifically to route selection, that could be clarified by the PSC for all parties:
    a. How much additional cost for rebuilding/co-locating with existing lines is too much?
    b. If rebuilding/co-locating means condemning and/or relocating homes or other buildings, is it still supported by the PSC and if so, how many homes or businesses are too many?
    c. What are the transmission reliability expectations of the PSC? Should utilities plan for future capacity in their current projects?
    d. Are there issues that the PSC will not consider in deliberating a CPCN case? (e.g. impacts to property values, environmental elements, EMF, etc.)
    e. Can the PSC develop technical positions on any issues that will help utilities better prepare and property owners and intervenors focus on relevant and key issues of the project?

The consistency and continuity that such guidelines could offer are critical to successful long term development of the transmission system and are needed to bridge the normal transitions that occur among the PSC staff and Commissioners, as well as utility staff changes and the use of various consultants. Generally, everyone understands the need for reliable, affordable electric service, which includes the construction of transmission lines. This process must succeed for needed projects to be built – we should all strive to make it as fair and efficient as

possible. EKPC stands ready to work with the PSC, the Legislature, and the public to achieve that goal.