STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY	:	
	:	
Application of COMMONWEALTH EDISON COMPANY, for a Certificate of Public Convenience and Necessity, pursuant to Section 8-406 of the Illinois Public Utilities Act, and for an Order, under Section 8-503 of the Illinois Public Utilities Act, authorizing and directing ComEd to construct, operate, and maintain a new electric transmission line in Kane County, Illinois.	:	No. 02-0838

Direct Testimony of

MICHAEL F. BORN, P.E.

Consulting Engineer
Distribution Planning Department
Commonwealth Edison Company

Attachments

MFB-1 Diagram of existing 138 kV lines and substations
MFB-2 Diagram of existing 34 kV lines and substations
MFB-3 Diagram of proposed 138 kV line and other proposed system additions
MFB-4 Diagram of 34 kV lines and substations with alternative project
MFB-5 Load and Capacity Forecast, 138 kV Expansion Plan (2003-2013)
MFB-6 Load and Capacity Forecast, 34 kV Expansion Plan (2003-2013)
MFB-7 Economic Comparison of Proposed and Alternative Plans

Q. Please state your name and business address.

A. Michael F. Born, Two Lincoln Center, Oakbrook Terrace, Illinois.

Q. By whom and in what position are you employed?

A. I am employed by Commonwealth Edison Company (ComEd) as a Consulting Engineer in its Distribution Planning department which is a part of the System Engineering and Planning organization.

Purpose of This Testimony

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to explain the need for additional Transmission and Distribution system capacity in the Fox River Valley area of central eastern Kane County. I will describe the recommended 138,000 Volt (138 kV) line extension and lower voltage line extension alternatives.

Professional Qualifications & Experience

Q. How long have you been employed by ComEd?

A. I have been employed by ComEd for over 30 years.

Q. Please describe your educational background.

A. I received a Bachelor of Science Degree in Electrical Engineering from Purdue University in 1971. I have also taken a number of post-graduate courses in power engineering from the Illinois Institute of Technology.

Q. Are you licensed as a Professional Engineer in the State of Illinois?

A. Yes. I have been a Licensed Professional Engineer in the State of Illinois since 1976.

Q. Have you served as a member of any professional organizations, committees, or task forces, relating to electrical engineering?

A. I am currently a Senior Member of the Institute of Electrical and Electronics Engineers, commonly known as "IEEE," and am a Member of the IEEE Power Engineering Society. I have served on an Electric Power Research Institute Task Force studying methods of evaluating and planning generating capacity expansion. I also served for several years on the Working Group of the Mid-America Interconnected Network, commonly known as "MAIN," that assessed adequacy of generating capacity.

Q. Have you taught any courses or seminars in electrical engineering, electric system planning, and electric line planning and design?

A. Yes. I have taught Engineering Economics courses to numerous engineers and accountants. The courses in Engineering Economics I have taught cover topics including the analysis of engineering alternatives and the calculation of the cost and present value of revenue requirements of capital projects.

Q. Please describe your responsibilities as a Consulting Engineer in the Distribution Planning Department.

A. I am the key technical consultant for the professional engineers and planners responsible for the evaluation and planning of modifications, reinforcements, upgrades, and expansions to ComEd's distribution network and to the portions of ComEd's transmission system which supply it, system-wide. Among other things, my department is responsible for analysis of reported and forecast loads on various portions of ComEd's system (including both transmission substations and the transmission-distribution centers and distribution centers, which supply electricity to the lower-voltage distribution system). These forecasts are used in order to assess whether there is, or will be, a need to add to, or change, the system in order to better serve our customers.

Q. What was your most recent position before becoming a Consulting Engineer?

A. I was the Distribution Planning Manager.

Q. What were your duties as Distribution Planning Manager?

A. From 1998 through 2000, I was responsible for direction and oversight of the planning for adequate capacity of distribution circuits and substations. That meant managing the professional engineers and planners responsible for the evaluation and planning of modifications, reinforcements, upgrades, and expansions to ComEd's distribution network and to the portions of ComEd's transmission system which supply it, system-wide.

Q. What positions have you held prior to that?

A. Early in my engineering career at ComEd I worked in a Division Engineering office and at the System Technical Center planning and evaluating various distribution systems, including both feeders and substations. Subsequently, I served as District Engineer for the DeKalb District. As District Engineer, I was responsible for all of the engineering operations in the District, including those relating to the planning and maintenance of distribution service. I also supervised the various field engineers assigned to the District.

In 1978, I became the Planning Supervisor for the Northern Division. As Planning Supervisor, I was responsible for overseeing the adequacy of the distribution system throughout the entire Northern Division, which includes the north and northwest suburbs of Chicago. My duties included the evaluation of existing distribution systems including both feeders and substations and the planning of reinforcements, upgrades and expansion where required to serve our customers.

In 1983, I transferred to ComEd's headquarters, as a Senior Engineer in the System Planning Department. Thereafter, in 1988, I was promoted to Section Engineer in charge of the Distribution Planning Section of the System Planning Department, which position I held until 1993, when I became ComEd's Substation Planning Engineer as a result of centralizing distribution planning activities. As ComEd's Substation Planning Engineer, I had duties similar to those which I previously held, but in connection with a variety of distribution capacity enhancement projects. In 1998, the Distribution Planning and Reliability Department was replaced by the Transmission and Distribution Planning Department and I was given responsibility for oversight of the planning for capacity-related distribution reinforcements and distribution-supply projects. Transmission and Distribution Planning were separated in 2000, and I began my current assignment as a Consulting Engineer in April 2000, reporting to the Director of Distribution Planning.

A. What experience do you have with the design and construction of electrical transmission, distribution, and transformation systems?

A. For a number of years, I have been involved on a day-to-day basis with the evaluation, planning, design, and construction of many components of ComEd's system, including numerous 138 kV lines. I have analyzed many actual and proposed 138 kV systems, including lines and substations, and have designed and planned many of ComEd's 138 kV lines now in operation. I have also been involved with, and supervised, the planning, design, and construction of a wide variety of distribution lines and systems.

Q. Are you familiar with ComEd's electrical transmission and distribution systems?

A. Yes. Through my various experiences with ComEd, I have become familiar with the components of these systems and how they functionally affect the flow of power through ComEd's system and to ComEd's customers.

Q. Are you familiar with the Petition filed in this proceeding?

A. Yes, I am.

Q. How have you become familiar with the Petition?

A. My department is responsible for monitoring ComEd's distribution system and the transmission facilities that supply it, in order to determine when new or reinforced facilities are required in order to maintain adequate, efficient, and reliable service. Engineers and planners under my direction are also responsible for analyzing alternative ways of meeting that need. I have personally been involved with the effort to develop and analyze potential solutions to the service needs of Fox River corridor in eastern Kane County since the late 1980's.

History of the Batavia, Geneva, and St. Charles Interconnections

Q. Please describe the municipal electric systems of Batavia, Geneva, and St. Charles and how is ComEd's system interconnected with them?

A. Each of these three cities operates its own, independent municipal electric utility, and distributes power locally to the customers located within those cities. Each of the municipal utilities purchases power, from ComEd or from other sources, and pays ComEd to deliver the power to multiple interconnection points between the cities and ComEd's system. In other words, these cities are wholesale customers of ComEd.

At the present time, ComEd maintains five 34 kV connections with Batavia, eight 34 kV connections with Geneva, and eight 34 kV connections with St. Charles. These are described in more detail below.

Q. Have the connections between ComEd and the cities changed over the years?

A. Yes. As load has grown, we have added additional 34 kV lines to serve the cities over the years.

Q. Have the cities requested any new points of service or new lines?

A. Yes. Beginning in the mid-1980's, St. Charles and Batavia have sought to be interconnected to ComEd's system through higher voltage 138 kV lines. More recently, Geneva has also asked ComEd to evaluate the possibility of connecting it directly to ComEd's 138 kV system.

Q. How has ComEd handled these requests over the years?

A. ComEd has investigated the cities' requests for new points of service and new interconnections. Over the years, ComEd has evaluated the engineering and economic aspects of interconnecting Batavia and St. Charles to its system via 138 kV lines. We have also confirmed our obligation to evaluate this in various agreements that ComEd has entered into with these two cities over the years. For example, this issue was addressed in the Electric Service Contracts between the cities and ComEd in 1994.

Q. Please generally describe what has occurred since 1994 concerning the cities' request for service at 138 kV.

A. ComEd has, at least annually, reviewed with the cities their power needs based upon growth in the area, etc. In 1997, the cities and ComEd agreed that certain modifications to their existing facilities (with financial contributions from ComEd) would then provide sufficient reliability so as to not require construction of a new 138 kV line. ComEd made those modifications. In 1999, the cities renewed their interest in obtaining interconnections through a 138 kV line. ComEd suggested that the cities begin to, among other things, evaluate proposed connection points and feasible routes for the line. In January, 2000, the cities intervened in certain proceedings before FERC relating to the ComEd/PECO Energy merger, claiming, among other things, that ComEd had violated agreements with the cities to construct a 138 kV transmission line to serve the cities. In connection with the resolution of that dispute, the cities and ComEd entered into a settlement agreement which, among other things, confirmed ComEd's obligation to evaluate the engineering and economic aspects of serving the cities through a 138 kV interconnection. After receiving from the cities information relating to projected load growth in the area and the location of the interconnection points, ComEd conducted a two year study to determine the least cost method of serving the cities' load. As described later in my testimony, ComEd has now determined that providing service via 138 kV lines is the least cost method of serving the cities.

<u>Overview of System Planning</u>

<u>Design of ComEd's T&D System</u>

Q. How does ComEd's transmission and distribution system deliver electricity to customers?

A. ComEd's distribution system customers receive electricity from a variety of generation sources, which is delivered through the transmission and distribution system at the voltage and the quantity required.

A network of 765, 345, and 138 kV transmission-voltage lines form the backbone of ComEd's transmission system. These lines move "bulk" power from the various sources of supply to the areas of ComEd's service territory where customer demand exists. They are the most reliable form of power line, as well as the most electrically efficient. They are capable of moving power with little energy loss or voltage drop.

These transmission-voltage lines, in turn, supply power to various types of substations or centers. At these facilities the power is converted by a transformer, or "stepped down," from transmission voltages to the lower voltages used for distribution to ComEd's customers. In some cases the voltage is stepped down directly from transmission voltages to the voltages (typically 12.5 kV, but in some cases 4 kV) used for local distribution lines or "feeders." Alternatively, the voltage may be first stepped down to an intermediate level, typically 69 kV in Chicago and Rockford, and 34 kV elsewhere, for further distribution to other substations, where the voltage is either stepped down to supply the local distribution lines, or supplied directly to large customers.

Once stepped-down to distribution voltages, electricity is delivered, or "distributed," to customer transformers through the distribution system. This system consists of distribution lines, transformers, switches, breakers, and other electrical equipment that ComEd uses to deliver power from the various substations to the customer. Distribution lines are the most limited in both length and capacity, and generally have the highest losses.

Q. Please provide a general description of the higher-voltage transmission and distribution facilities that comprise ComEd's system.

A. Facilities on ComEd's transmission and distribution system that operate at higher than 12 kV include the following major components:

- Generating station terminals;
- Bulk power transmission substations ("TSS's");
- TSS's that supply the distribution system;
- Transmission distribution centers ("TDC's");
- Electric service stations ("ESS's") supplying large customers such as factories;
- The 765 kV subsystem;
- The 345 kV subsystem;
- The 138 kV bulk power subsystem;
- The 138 kV non-bulk power subsystem;
- The 69 kV subsystem;
- The 34 kV subsystem.

System Planning and Design Considerations

Q. What factors must be considered in developing an adequate, efficient, and reliable transmission and distribution system plan?

A. A transmission and distribution plan must provide capacity to meet projected needs, under both normal and appropriate and foreseeable outage (or "contingency") conditions. Effects on the existing system must be considered. ComEd has developed planning criteria which assure that its system can adequately respond to outages. For example, the system must be able to continue to serve customers even if a single transmission line or substation transformer fails.

A level of reliability must be maintained appropriate to the number of customers at risk to possible system failures, balanced by providing service at a reasonable cost. The plan should avoid equipment damage or widespread service outages in case events more severe than planned occur. ComEd has developed planning criteria that assure its system can adequately respond to unplanned and planned outages.

A suitably robust plan should also consider long-range, area-wide requirements for system operation and future growth. It should be adaptable, with a minimum of wasted effort, to changed conditions such as load levels or load locations, without requiring costly and time-consuming acquisition of new substation sites or line rights-of-way.

Q. Please explain how you determine that a plan has the capacity to meet projected needs with required voltage levels.

A. This requires an engineering evaluation of the system as a whole as well as critical individual system components (transformers, lines, switchgear), under both system normal and contingency conditions. Each component of a feasible plan must be able to operate at projected peak loads, under both system normal conditions and under outage contingency conditions. Apart from providing adequate capacity to transmit and distribute power, the system must also maintain adequate voltage levels at supply points. Determining the ability of a system to meet capacity and voltage requirements requires technical studies of the capability of each critical component under varying power flows corresponding to normal operation and to the various contingency conditions.

Planning Methodology

Q. Does ComEd's transmission and distribution planning staff regularly assess the adequacy of existing facilities to transmit and distribute power to customers?

A. Yes.

Q. How does it do that?

A. ComEd constantly collects data on the load on various portions of its system, from which data ComEd identifies the yearly actual peak loads experienced by various components of ComEd's system, including substations and transmission and distribution lines. ComEd's planners also forecast the likely peak loads to be experienced in the future, over a time horizon which varies in length depending upon the portion of the system being studied. In arriving at these forecasts, ComEd's planners may take into account past growth, new development plans and other planned customer expansion (both publicly announced and known to ComEd's Energy Services and New Business staff), and local and regional governmental forecasts.

For forecasting purposes, actual annual maximum loads are adjusted to represent the load that would be experienced under extreme hot weather conditions that occur once every 10 years in the area where the substation is located. The once in 10-year peak day extreme hot weather design level is based on the most recent 30 years of annual peak day weather history for that area. The adjustment factor for a substation is based on the relationship of daily peak loads to daily cooling degrees in recent years.

Planning engineers within ComEd then analyze this data to determine where load is likely to place strain on the system. In the case of the distribution system and the portions of the transmission system that directly supply it, that function is performed by the Distribution Planning Department, of which I am a part. The system is evaluated under forecasted peak load conditions. It is also evaluated under both normal operating conditions and under a variety of planning contingencies, which again vary with the type of equipment and its relationship to the system as a whole, such as the inevitable outages of facilities, whether planned or unplanned. These assessments permit ComEd to determine when, and to what extent, reinforcement of the system is needed.

Q. What actions are taken based upon such an assessment?

A. When the data shows that an area requires supply reinforcement, ComEd staff, in both the planning and design engineering areas, identify feasible alternatives consistent with long-range plans and sound engineering and system planning practices. Depending on the size and nature of the need, there may be many alternatives or few alternatives which are technically feasible, legal, and potentially cost-effective. We then determine what option or options are consistent with our obligations to provide reliable service to our customers.

If there is more than one such option, we assess reliability and cost advantages to the various alternatives, and select as the proposed plan the option that would provide adequate, efficient, and reliable service to customers at the least cost.

Need for System Reinforcement

Q. Did ComEd conduct a study of the electrical supply system in the Fox River Valley area?

A. Yes, it did.

Q. What did this study show?

A. It showed that reinforcement of the supply system in the area is required to maintain adequate reliability of service. Absent reinforcement, there will be overloads on the substations that supply the 12.5 kV and 34 kV distribution feeders that supply St. Charles, Geneva, Batavia, North Aurora and nearby areas in eastern Kane County.

The Study Area

Q. Please describe the boundaries of the area under study.

A. The study area included the eastern portion of Kane County including St. Charles, Geneva, Batavia, North Aurora and nearby areas within the County. The boundaries can be roughly described as from South Elgin to Interstate 88 (north to south) and between Route 59 and Route 47 (east to west).

Q. How did you determine what areas to study?

A. The study area was principally determined by identifying the service areas of those substations and distribution feeders projected to be approaching capacity limits over the next five years and those substations and feeders in adjacent areas where loads transfers or extensions of feeders would provide feasible alternatives to meet future capacity requirements.

Existing Supply System

Q. Describe how the Fox River Valley area is presently supplied with electric power.

A. The study area is presently served by six substations where transmission level voltage (138 kV) is transformed to a distribution level (34 or 12.5 kV). For some ComEd retail customers, power at 34 kV is further transformed to 12.5 kV at a ComEd Distribution Center substation. Both types of substations supply distribution feeders that, in turn, supply customers in the study area. The municipal utilities of St. Charles, Geneva and Batavia receive power at 34 kV at several delivery points for distribution within the towns and subsequent transformation to lower distribution voltages.

The 34 kV substations in the study area are at Electric Junction TSS111, Spaulding TSS79, South Elgin TDC577, West Chicago TSS131 and North Aurora TSS56. The 12.5 kV substation terminals in the study area are at North Aurora TSS56 and Sugar Grove TDC569. The 12.5 kV substation terminals at South Elgin and West Chicago are adjacent to the study area, but are not included in the study since capacity margins are adequate in the foreseeable future and the transfer of load to these terminals would not be a feasible solution to capacity shortages within the study area.

Q. Describe how the three municipal utilities are presently supplied with electricity.

A. Each of the municipal utilities receives power at several points at a delivery voltage of 34 kV. ComEd has revenue metering equipment at each of these points capable of measuring kilowatt (kW) demand and kilowatt-hour energy consumption. In most cases, the metering is at the 34 kV interconnection point. In some cases, the metering is located at the low voltage winding of the municipal utility's step-down transformer. Batavia and St. Charles have their own 34 kV circuits that are utilized to deliver power to other municipal substations. Geneva does not have such circuits and steps 34 kV to a lower distribution voltage using municipally-owned transformer(s) at each delivery point.

Table 1. Power Delivery Points to Municipal Utilities (2002)

City	**Location**	**ComEd ID**	**34 kV Line Number**	**138-34 kV Substation**
Batavia	Cherry Park	W519	11162	111 Electric Junction
Batavia	Holmstad	W511	5635	56 No. Aurora
Batavia	Main	W510-1	11163	111 Electric Junction
Batavia	Main	W510-2	5637	56 No. Aurora
Batavia	Paramount	W509	11167	111 Electric Junction / 131 W. Chicago
Geneva	Peyton	W461	13153	131 W. Chicago
Geneva	Western	W484	5633 (5635 summer 2003)	56 No. Aurora
Geneva	Keslinger	W485	13156 (5639 summer 2003)	131 W. Chicago (56 No. Aurora summer 2003)
Geneva	Averill	W494-1	13153	131 W. Chicago
Geneva	Averill	W494-2	13150	131 W. Chicago
Geneva	Eastside	W550-1&2	13154	131 W. Chicago
Geneva	South St.	W553	13156	131 W. Chicago
St. Charles	City Hall	W513-1	13150	131 W. Chicago
St. Charles	City Hall	W513-2	13154	131 W. Chicago
St. Charles	City Hall	W513-3	7962	79 Spaulding
St. Charles	12th St.	W562	57736	577 So. Elgin
St. Charles	Kirk Rd	W565-1	13155	131 W. Chicago
St. Charles	Kirk Rd	W565-2	13156	131 W. Chicago
St. Charles	Dunham	W567	13159	131 W. Chicago
St. Charles	Peck Rd	W568	57736 (5639 summer 2003)	577 So. Elgin (56 No. Aurora summer 2003)

Q. What are Attachments MFB-1 and MFB-2?

A. Attachment MFB-1 is a map showing the location of ComEd's 138 kV lines and substations serving the Fox River Valley area prior to summer 2004. Attachment MFB-2 is a map showing the location of existing 34 kV lines and substations in the Fox River Valley area prior to summer 2004.

Q. What steps has ComEd already taken in recent years to forestall such overload conditions?

A. Since 1999, ComEd has undertaken virtually every effective step to reinforce the existing distribution supply system in this area. In particular, ComEd has:

- Installed a 3rd 40 MVA, 138-34 kV transformer at North Aurora TSS in 1999.
- Installed a 4th 40 MVA, 138-34 kV transformer at West Chicago TSS in 2000.
- Installed a 2nd 138-34 kV (60 MVA) transformer at South Elgin TDC in 2001.
- Installed a 4th 40 MVA, 138-34 kV transformer at North Aurora TSS in 2003.

Q. Do the transformers in this area have cooling fans installed?

A. Yes.

Q. Do the transformers in the area have automatic load tap changing equipment?

A. Yes.

Q. Does ComEd take this load tap changing equipment into account when analyzing possible overloads and low voltage conditions?

A. Yes.

System Reinforcement Needs

Q. Please describe the need for reinforcement in the Fox River Valley area.

A. As I mentioned above, absent reinforcement, the existing electrical supply system in the area we studied will suffer a number of overload conditions as early as the summer of 2004.

Q. What is the significance of these overloads?

A. These overloads will threaten ComEd's ability to continue to provide adequate and reliable service to customers in this area, unless supply reinforcement is provided.

Q. Describe the overloads that will occur.

A. The overloads are shown in Table 2. Table 2 identifies the substations serving the Fox Valley area, their allowable power ratings and the load forecast for 2004. In Table 2, we see that five of the seven substation terminals will experience overloads, while the two other terminals will be loaded to 100% of the planned allowable limit. In Table 2, and in the following Tables 3-5, the loadings are based on the peak load under the extreme conditions expected to occur one day in 10 years. Loading under "Normal Conditions" means that, on that peak day, all transformers are in service to supply load. Loads in Table 2 are compared to normal transformer ratings.

Table 2. Substation Loading Without System Reinforcement

138-34 and 138-12.5 kV Transformer Loading, Normal Conditions (2004)					
Substation	Transformers	KV	Rating (MVA)	Load (MVA)	% of Rating
North Aurora TSS56	4-20 MVA	12.5	87	89.0	102%
North Aurora TSS56	4-40 MVA	34	179	183.6	103%
West Chicago TSS131	4-40 MVA	34	181	185.0	102%

Under "Contingency Conditions," it is assumed that the largest of the transformers is unavailable due to an unplanned outage. Under Contingency Conditions, the load is supplied by the remaining transformers using short term emergency ratings that are intended for use during the replacement or repair of a failed transformer. Loads in Table 3 are compared to emergency transformer ratings.

138-34 and 138-12.5 kV Transformer Loading, Contingency Conditions (2004)					
Substation	Transformers	KV	Rating (MVA)	Load (MVA)	% of Rating
South Elgin TDC577	1-40, 1-60 MVA	34	68	72.8	107%
Spaulding TSS79	2-40, 1-60 MVA	34	121	120.4	100%
Electric Junction TSS111	2-60 MVA	34	143	145.8	102%
Sugar Grove TDC569	1-20, 1-40 MVA	12.5	34	33.9	100%

In addition, one 34 kV line will be overloaded under normal conditions. This line and the magnitude of the overload is listed in Table 4.

Table 4. 34 kV Line Overloads, Normal Conditions

34 kV Line Overloads, Normal Conditions (2004)			
Line	Rating (MVA)	Load (MVA)	% of Rating
5635	35.1	39.4	112%

Another 34 kV line will be overloaded after load is transferred to adjacent circuits in the event of a failure of 34 kV line 13155. This contingency line overload is listed in Table 5.

Table 5. 34 kV Line Overload, Contingency Conditions

34 kV Line Overloads, Contingency Conditions (2004)				
Line	Outage	Rating (MVA)	Load (MVA)	% of Rating
13156	13155 out between West Chicago TSS131 and St. Charles W565	55	64	117%

Q. Please describe the significance of these overload conditions.

A. The consequences of loading a transformer in excess of its emergency rating for a prolonged period of time is to reduce its usable life, in some cases requiring its premature replacement, and to increase the risk of that transformer failing. In addition, a severe transformer overload can result in an immediate failure of the overloaded equipment or in increased susceptibility to later failure if the transformer is subjected to another stressful event, such as a lightning strike or short circuit on a distribution circuit. Moreover, because of the loading levels in the study area, if a transformer is unavailable, system operators may be forced to delay restoration of service until the transformer was replaced or repaired, or until load was otherwise reduced. Transformer overload conditions, and the resulting inability to take a transformer out of service, also limits ComEd's ability to conduct required maintenance.

An overload of an overhead line causes the conductor to heat up and sag, often resulting in an unacceptable distance from the conductor to lower conductors, nearby public or privately owned structures which can result in violation of safety standards and may cause permanent damage to the conductor resulting in immediate or increased risk of failure in the future.

Q. Are the system reinforcement needs which you have described dependent on long-term load growth forecasts?

A. No, the need for system reinforcement is necessary due to existing conditions and not dependent on long-term growth in the area. All of the overloads discussed will occur with little or no peak load growth by 2004.

Q. Has ComEd conducted any estimates of future load in the area?

A. Yes.

Q. Why did you do that?

A. Based on current load levels, without growth, we know that reinforcement is needed. However, the loads in this area are expected to continue to increase as a result of continued development of residential and commercial properties within the study area both within the service area of the municipal utilities as well as in the area in which ComEd provides retail delivery service. To select an optimal, least cost solution, we need information on growth over the next several years, so the effectiveness and cost of alternatives can be compared.

<u>Area Load Forecasts</u>

Q. Please describe ComEd's load forecasts for the area.

A. The study area is one of the more rapidly growing areas in the ComEd service territory. The load forecast is based on both ComEd's assessment of historic and future load growth of the entire area as well as load forecasts developed by the cities of St. Charles, Geneva and Batavia for each of their municipal systems. The starting point for forecast load is the most recent annual peak load (summer 2002) adjusted for 90^{th} percentile weather conditions.

Q. What are the historical distribution substation and circuit loads for this area?

A. The substation and circuit actual peak loads for 1998 through 2002 are listed in Table 6.

Table 6. 1998-2002 Area Actual Loads (MVA)

	kV	1998	1999	2000	2001	2002
		6/25/1998	7/30/1999	8/31/2000	8/9/2001	8/1/2002
Actual Substation Peak Load						
79 Spaulding	34	98	109	110	115	107.3
577 So. Elgin	34	0	36	41.4	50	60.4
131 W. Chicago	34	152	144	166.3	184	186.1
56 No. Aurora	34	88	116	116.3	122	120.2
111 Electric Junction	34	129	145	131	145	136
56 No. Aurora	12.5	77	85	80.6	91.7	89.9
569 Sugar Grove	12.5	23	25	23.7	27.6	32.3
Total Substation MVA		**567**	**660**	**669.3**	**735.3**	**732.2**
Actual 34 kV Line Load						
L7962	34	15	25.1	22	27	25.4
L57736	34	0	15	14.8	17	16.4
L11167 (TSS131)	34	-17	-13	7.7	16.5	17.2
L13150	34	32.4	27.9	23.1	27.1	24.5
L13153	34	32.4	28.2	24.4	21.8	21.3
L13154	34	47.1	41.3	37.4	41.4	42.3
L13155	34	30.5	33.9	36.6	25.3	20.4
L13156	34	34.7	39.8	38	22.2	50.9
L13159	34	0	0	0	35.2	15.5
L5633	34	8.5	26	32.8	32.4	31.8
L5635	34	22.8	26.6	22.4	26.8	21.1
L5637	34	25.9	21.5	25.6	19.1	25.2
L11162	34	18.8	24.2	34.1	22.7	22.6
L11163	34	14.9	23.3	21.9	25.5	22.8
L11167 (TSS111)	34	24	21	12.7	18.4	26.2
Total 34 kV Line MVA		**290**	**340.8**	**324.1**	**375.9**	**383.6**
Municipal Utility Load (MW)						
Batavia		65.7	72.3	72.8	79.3	82.7
Geneva		53.2	63	65.1	67.9	68.6
St. Charles		100.1	104.4	111.6	115	122.4
Total Municipal Load		**219**	**239.7**	**249.5**	**262.2**	**273.7**

Q. What is the purpose of the information in Table 6?

A. This shows the historical trend of the load growth in the area. This is a starting point for developing a forecast of future growth.

Q. Are these historical loads directly used to forecast future loads?

A. No. Customer air conditioning, which is primarily driven by hot weather conditions, influences annual peak load levels on substations and feeders. To make the actual reported figures comparable, historical loads are adjusted for extreme hot weather conditions that could occur once every ten years. This weather level was chosen to avoid exceeding equipment ratings and low voltage conditions on nearly all annual summer peak days. An adjustment factor was determined from a regression of hot weather daily substation peak loads and weather for this area. This factor is used to adjust the actual peak loads by using peak day weather conditions and the 90^{th} percentile of peak day weather conditions in this area over the previous 30 years. The results of this weather adjustment are listed in the following table. For the purpose of weather adjusting loads for this area, the maximum temperature at O’Hare Airport was selected as the most appropriate measure of hot weather.

Table 7. 1988 – 2002 Weather Adjusted Substation and Feeder Loads (MVA)

	kV	**1998**	**1999**	**2000**	**2001**	**2002**
Weather Adjusted Substation Peak Load						
79 Spaulding	34	103.1	107.6	120.0	121.0	114.3
577 So. Elgin	34	0.0	35.5	45.2	52.6	64.3
131 W. Chicago	34	159.9	142.1	181.4	193.6	198.2
56 No. Aurora	34	92.6	114.5	126.9	128.3	128.0
111 Electric Junction	34	135.7	143.1	142.9	152.5	144.8
56 No. Aurora	12.5	80.4	84.1	86.8	95.7	94.8
569 Sugar Grove	12.5	24.2	24.7	25.9	29.0	34.4
Total Substation MVA		595.9	651.6	729.1	772.8	778.9
Curtailments (estimated)		17.9	19.5	0.0	0.0	0.0
WA Load w/o curtailment		613.7	671.1	729.1	772.8	778.9
Weather Adjusted 34 kV Line Peak Load						
L7962	34	15.8	24.8	24.0	28.4	27.1
L57736	34	0.0	14.8	16.1	17.9	17.5
L11167 (TSS131)	34	-17.9*****	-12.8*****	8.4	17.4	18.3
L13150	34	34.1	27.5	25.2	28.5	26.1
L13153	34	34.1	27.8	26.6	22.9	22.7
L13154	34	49.5	40.8	40.8	43.6	45.0
L13155	34	32.1	33.5	39.9	26.6	21.7
L13156	34	36.5	39.3	41.5	23.4	54.2
L13159	34	0.0	0.0	0.0	37.0	16.5
L5633	34	8.9	25.7	35.8	34.1	33.9
L5635	34	24.0	26.3	24.4	28.2	22.5
L5637	34	27.2	21.2	27.9	20.1	26.8
L11162	34	19.8	23.9	37.2	23.9	24.1
L11163	34	15.7	23.0	23.9	26.8	24.3
L11167 (TSS111)	34	25.2	20.7	13.9	19.4	27.9
WA Total 34 kV Line MVA		305.1	336.4	385.7	398.1	408.5
Municipal Utility Load (MW)						
Batavia		69.1	71.4	79.4	83.4	88.1
Geneva		56.0	62.2	71.0	71.4	73.1
St. Charles		105.3	103.0	121.8	121.0	130.4
WA Total Municipal Load		230.4	236.6	272.2	275.8	291.5
	Design Temp					
MaxTemp (ORD)	99	95	100	92	95	94

***** Negative values indicate that power is flowing into the substation.

Q. What has been the historical rate of load growth for this area?

A. From 1998 through 2002, the compound annual rate of load growth, adjusted for extreme hot weather conditions for this area and load curtailments, was approximately 6% per year. Substation and 34 kV circuit annual peak load growth rates for this area is listed in Table 8.

Table 8. Weather Adjusted Load Growth Rate 1998 – 2002 (MVA)

	1999	2000	2001	2002	Average growth	Compound growth
Total Substation MVA	9.4%	8.6%	6.0%	0.8%	6.2%	6.1%
Total 34 kV Line MVA	10.3%	14.7%	3.2%	2.6%	7.7%	7.6%
Total Municipal Load	2.7%	15.1%	1.3%	5.7%	6.2%	6.1%

Q. What rate of load growth is expected in the future?

A. For the analysis of future capacity needs in the Fox Valley area, ComEd used a load growth of 4% of the 2002 weather adjusted peak for 2003 through 2007 and a declining rate of growth beginning in 2008 that reaches an annual rate of 2.5% in 2013.

Q. What was the basis for this load growth forecast?

A. It is expected that continued residential and commercial development of the open land within the study area will continue for the foreseeable future. Residential development has reached record levels in the suburban Chicago area, as well as within the study area during the previous four years. A slight decline in the number of residential permits in the study area in 2002 may indicate that somewhat fewer homes will be completed during 2003. Historical permits for the study area are listed in Table 9. Load forecasts developed by Batavia, Geneva and St. Charles as well as long term commercially available demographic forecasts indicate that the annual rate of development will decline over the next 10 years as the need for housing declines and as less land becomes available for development. Demographic forecast information obtained from Economy.com for population, households and employment for Kane County is listed in Table 10.

Table 9. Residential Permits

Area	Type	1997	1998	1999	2000	2001	2002 (prelim)
Batavia	single	137	167	227	215	135	187
	multi	8	6	7	0	0	44
Elburn	single	34	52	51	49	51	30
	multi	16	11	42	41	10	2
Geneva	single	138	145	215	240	290	248
	multi	0	40	11	4	18	0
North Aurora	single	124	171	289	418	239	163
	multi	68	9	0	0	0	0
St Charles	single	154	234	443	431	425	378
	multi	8	237	255	10	104	10
Sugar Grove	single	46	42	82	140	304	385
	multi	0	0	0	0	0	2
Wayne	single	14	26	26	26	20	5
	multi	0	0	0	0	0	0
Balance of Kane County (unincorporated)	single	402	494	609	573	534	539
	multi	24	27	6	0	0	0
Total Number of Units	single	1049	1331	1942	2092	1998	1935
	multi	124	330	321	55	132	58

Source: Northeastern Illinois Planning Commission (http://www.nipc.org/permits)

Table 10. Kane County Demographic Forecasts

	1998-2002 History	2003-2007 Forecast	2008-2012 Forecast
Population	3.3%	2.6%	1.4%
Households	3.1%	2.8%	2.3%
Employment	3.3%	2.3%	1.6%

Source: Economy.com

It would be reasonable to expect that the recent rate of load growth (approximately 6% per Table 8) would decline in a similar ratio to the declining demographic growth rate for the county as a whole. It is also reasonable to expect that the rate of electric load growth will be greater than the rate of growth of population and employment. Loads increase as existing customers acquire both additional and new types of equipment that uses electric power. The use of personal computers, home office equipment and electronic entertainment equipment are examples of increased power use by existing customers. Table 11 shows the projected forecast growth rates for the next five-year period and the following five-year period based on a 6% historical area load increase and demographic growth rates of 3.3% historical, 2.5% for 2003-2007 and 1.5% for 2008-2012.

Table 11. Area Load Growth Based on Demographic Forecasts.

	Historical	Forecast	Forecast
	1998-2002	2003-2007	2008-2012
Population Increase	3.3%	2.5%	1.5%
Load Growth Rate	6%	4.5%	2.7%

Q. What other considerations were used in selecting a load growth rate for the area?

A. Ten year load forecasts were prepared by each of the municipal utilities. The results of this forecast are shown in Table 12. The average rate of increase for the 2003-2007 and 2008-2012 periods compares very favorably to that obtained from the demographic forecasting approach. Both approaches confirm that the load growth rates selected for the system analysis are appropriate. By comparison, this long term growth rate of peak load on ComEd’s system as a whole is 1.7%.

Table 12. Municipal Utility Load Forecast (MVA)

Year	Batavia	Geneva	St. Charles	Total	annual	5 yr avg
2002	92.0	85.1	131.4	308.5		
2003	98.8	87.5	138.0	324.3	5.1%	
2004	105.6	92.3	143.5	341.4	5.3%	
2005	112.2	95.0	147.8	355.1	4.0%	
2006	117.8	98.1	152.3	368.2	3.7%	
2007	123.6	102.4	156.8	382.8	4.0%	4.4%
2008	128.3	105.8	160.8	394.9	3.2%	
2009	133.6	109.2	164.8	407.5	3.2%	
2010	135.7	112.6	168.9	417.1	2.4%	
2011	138.3	115.9	173.1	427.4	2.5%	
2012	141.7	119.4	177.5	438.5	2.6%	2.8%

<u>ComEd's Plan Is Efficient and Effective</u>

Q. Please describe ComEd's proposal to meet the service needs in the Fox River Valley area.

A. ComEd proposes to install a new 16 mile 138 kV transmission line between its existing line 7915 at South Elgin substation TDC577 and existing line 11109 where it crosses Randall Road in Kane County. New transmission substations will be installed to permit interconnection between the ComEd transmission system the St. Charles and the Batavia municipal utility systems. 138 kV circuit breakers at these substations will provide for continuity of service in the event of a failure of a segment of the proposed 138 kV line. These circuit breakers will normally be operated in a closed position to permit the flow of power through the line. No other substations that would supply the distribution system from a transmission voltage are anticipated to be needed in this area until sometime after 2012. St. Charles and Batavia plan to install 138-34 kV substations and extend 34 kV lines from these substations to deliver power from the transmission system to their customers.

Q. From where will new 138 kV line draw its power?

A. This line will become part of the ComEd transmission network. The line would primarily be supplied from 345-138 kV step-down transformers at Wayne TSS144 and Electric Junction TSS111 substations.

Q. Have you prepared a one-line diagram showing the changes to the transmission system in the area after construction of the proposed 138 kV lines?

A. Yes. Attachment MFB-3 is a one-line diagram showing the proposed project.

<u>Customer Needs Are Met</u>

Q. Will ComEd's proposed project supply adequate, efficient, and reliable service to ComEd's customers in the Fox River Valley area?

A. Yes. ComEd's proposal provides the needed system reinforcement efficiently and reliably.

Q. Please explain how the proposed 138 kV lines will address the overloads you identified.

A. Loads on the St. Charles and Batavia municipal utility systems, currently supplied at 34 kV, will be transferred to the proposed 138 kV line. It is intended that the initial load transfers to the proposed 138 kV line will be completed by the cities for summer 2004. Portions of the remaining Batavia and St. Charles load would be transferred to the 138 kV system each year. It is anticipated that all Batavia load would be transferred by summer 2008 and all the St. Charles load would be transferred to the 138 kV system by summer 2011. The reduced load on the 34 kV lines and substation transformers will prevent the overloads and low voltage conditions I discussed above. This project enables the 34 kV capacity released by the cities to be utilized to supply ComEd's delivery system load growth in the study area. Based on this analysis of area capacity needs, no other major distribution system supply projects are necessary until sometime after 2013.

Q. Describe the reliability features of ComEd's proposal.

A. The proposed line will use proven designs, with good reliability track records. The network transmission line configuration will provide reliable supply to both the St. Charles and Batavia municipal systems as well as continuing to provide reliable supply to other customers supplied from 34 and 12.5 kV feeders in this area. This project enhances the reliability of supply to both the South Elgin TDC577 substation and North Aurora TSS56 substation by providing an alternate transmission supply from different structures and route direction than is currently available. An alternate low voltage capacity expansion plan would not provide this reliability enhancement.

Cost Estimate and Source of Funds

Q. What is the estimated cost of the proposed project, including the line and two new interconnection substations?

A. The total cost to ComEd is estimated to be $20 million in 2004 dollars including right-of-way costs.

Q. What will be the source of funds needed for construction of the line and substation?

A. Construction funds will be provided by internal financing as part of ComEd's construction program. ComEd is capable of financing the construction of the line and substation without adverse financial consequences for ComEd or its customers.

Q. Does ComEd's plant construction budget provide for construction of the line and substations?

A. Yes. Amounts budgeted for the construction of this line and substation, and acquisition of associated rights-of-way, represent less than 4% percent of ComEd's total plant construction expenditures (including indirect costs) for 2004.

Q. Is the proposed project least cost?

A. Yes, I believe the proposed solution is the best and least cost means of providing the needed reinforcement of ComEd’s transmission and distribution systems in the Fox River Valley study area, consistent with the requirements of safety and reliability.

Comparison to System Alternatives

Q. Did ComEd study any alternative means of meeting the electrical supply needs in this area?

A. Yes, we did.

Q. What factors did ComEd consider when it studies the alternatives?

A. ComEd's evaluation was conducted in accordance with the principles I discussed earlier in my testimony for developing an adequate, efficient, and reliable electric supply system. In particular, a feasible plan for this area must provide immediate relief of 138 - 34 kV, 138 – 12.5 kV transformer overloads and 34 kV lines, under both normal and the contingency conditions I’ve described, while maintaining adequate voltage conditions. A feasible plan must meet ComEd's reliability standards and be capable of being constructed in the time required. A plan should have the long-term capability to meet projected load growth without requiring new rights-of-way, new sites, or expensive facility additions.

A feasible alternative must also meet requirements unrelated to electrical design. For example, it must use facilities which can, as a practical matter, be constructed and it cannot require real estate that is unavailable at a reasonable cost or which cannot be acquired within the time required.

Alternatives Studied

Q. What system alternatives to the construction of the proposed line did ComEd consider?

A. ComEd studied one system alternative: expanding the capacity of existing substations within the area, adding and extending 34 kV lines and constructing an additional substation.

Q. Describe the 34 kV system expansion alternative.

A. This alternative would be to install new 138-34 kV transformers at three substations and new 138-12.5 kV transformers at one substation. This would also require the installation of several new 34 kV lines and extensions of existing lines. It is also expected that a new 138-34 kV substation requiring a new site near Elburn and the extension of a 138 kV line on a new route would be required with this alternative. Seven new 34 kV lines, five new 138-34 kV and two new 138-12.5 kV transformers would be installed by 2013. One 138-34 kV transformer would be replaced with a larger capacity unit during this period. In comparison, the proposed 138 kV plan requires no new ComEd 34 kV lines and only the replacement of one ComEd 138-12.5 kV transformer. The location of the new facilities for the alternative plan is shown in Attachment MFB-4.

Q. What did you conclude about this alternative?

A. It is not the least cost, and would involve the installation of considerably more ComEd facilities. The alternative will include the installation of approximately 40 circuit miles of new 34 kV line, five miles of new 138 kV line and seven high voltage distribution substation transformers. The proposed plan requires only the installation of a 15 mile 138 kV line segment, two interconnection substations and the replacement of one substation transformer. A tabulation of substation and 34 kV line loads and capacity for the period 2003-2013 for the proposed expansion plan is Attachment MFB-5 and a similar tabulation of load and capacity for the alternative plan is Attachment MFB-6. A comparison of the net present value of the discounted cash flow (NPV) for the proposed and alternative plans is contained in Exhibit MFB-7. The NPV for the proposed plan is over $10 million less than the alternative plan and is therefore the least cost plan.

Q. Does this conclude your testimony?

A. Yes it does.