Kentucky Public Service Commission

Staff Report On the

2006 Integrated Resource Plan Report

of East Kentucky Power Cooperative

Case No. 2006-00471

January 2008

SECTION 1

INTRODUCTION

Administrative Regulation 807 KAR 5:058, promulgated in 1990 and amended in 1995 by the Kentucky Public Service Commission, ("Commission") established a process under which the six major electric utilities under its jurisdiction file integrated resource plans ("IRP") on a periodic basis in order to afford the Commission Staff an opportunity to review the utilities' long-range resource plans. The goal of the Commission in establishing the IRP process was to ensure that all reasonable options for the future supply of electricity were being examined and pursued and that ratepayers were being provided a reliable supply of electricity at the lowest possible cost.

On October 20, 2006, East Kentucky Power Cooperative, Inc ("EKPC") filed its 2006 IRP with the Commission. The IRP includes EKPC's plans for meeting the electricity requirements of the retail customers served by its member cooperatives for the 2006-2026 period.

EKPC is a generation and transmission cooperative headquartered in Winchester, Kentucky. It provides all of the power requirements of 16 distribution cooperatives, which provide service in 89 counties located in eastern and central Kentucky. These member cooperatives, 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, Licking Valley RECC, Nolin RECC, Owen Electric Cooperative, Salt River Electric Cooperative, Shelby Energy Cooperative, South Kentucky RECC, and Taylor County RECC, serve primarily residential customers, which account for more than 90 percent of their 500,000-plus customers. At the time its IRP was filed, there were plans for Warren RECC to become a member of the EKPC system. However, those plans were cancelled shortly after the filing of the IRP.

EKPC owns and operates three coal-fired generating stations: the Dale, Cooper, and Spurlock stations. At the time of its IRP filing, it also owned and operated 7 gas-fired combustion turbines located at its Smith Station site. In addition, EKPC purchases power from the Southeastern Power Administration ("SEPA"). EKPC also owns and operates roughly 15 MW of landfill gas generation. The total capacity available to EKPC, including the SEPA power, at the time of its IRP filing, was 2,682 MW.

The purpose of this report is to review and evaluate the IRP in accordance with the requirements of 807 KAR 5:058, Section 12(3), which require the Commission Staff to summarize its review of IRP filings made with the Commission and make suggestions and recommendations to be considered in future IRP filings. The Staff recognizes that resource planning is a dynamic ongoing process. Thus, this review is designed to offer suggestions and recommendations to EKPC on how to improve its resource plan in the future. Specifically, the Staff's goals are to ensure that:

- All resource options are adequately and fairly evaluated;

- Critical data, assumptions, and methodologies for all aspects of the plan are adequately documented and are reasonable; and

- The selected plan represents the least-cost, least risk plan for the end use customers served by EKPC and its member cooperatives.

The report also includes an incremental component, noting any significant changes from EKPC's most recent IRP, which was filed in 2003.[1]

Based on forecasted average annual growth rates of 2.6 for peak demand and 2.3 for energy, EKPC projects that it will require approximately 1,546 MW in additional resources to serve its projected loads by 2020.

The remainder of this report is organized as follows:

Section 2, Load Forecasting, reviews EKPC's projected load growth and load forecasting methodology.

Section 3, Demand-Side Management, summarizes EKPC's evaluation of demand side management ("DSM") opportunities.

Section 4, Supply-Side Resource Assessment, focuses on EKPC's evaluation of supply resources options to meet future load requirements.

Section 5, Integration and Plan Optimization, discusses EKPC's overall assessment of supply-side and demand-side options and their integration into an overall resource plan.

[1] Case No. 2003-00051, THE 2003 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.

SECTION 2

LOAD FORECASTING

Introduction

EKPC provides wholesale power to 16 distribution cooperatives ("coops""), which in turn serve over 500,000 retail customers. EKPC assists each coop in preparing its individual system load forecast. EKPC then uses the 16 coop forecasts in preparing its own long range projections. Essentially, the coops' load projections extend out 20 years and these are summed together to obtain EKPC's 20 year load forecast.

Methodology

The purpose of the load forecast is to provide EKPC and the individual member coops with reliable load projections, which are essential for long range planning. The coops use their load forecasts to develop 2, 3, and 4 year construction workplans, long range work plans, and financial forecasts. EKPC uses its load forecasts for marketing analysis, transmission and power supply planning, and financial forecasting.

EKPC begins by preparing a preliminary forecast for each of the member coops. The preliminary forecast is based upon retail sales forecasts for six customer classes: residential, seasonal, small commercial, public buildings, large commercial, and other. EKPC's wholesale energy sales to its member systems are determined by adding distribution losses to total retail sales. EKPC's total energy requirements are estimated by adding transmission losses to its total wholesale sales. Seasonal peak demands are determined by applying peak factors for heating, cooling, and water heating to energy. This same methodology is employed for each member coop.

Factors that are considered in preparing the forecasts include: national, regional and local economic data, appliance saturation and efficiency, population and housing trends, service area industrial development, electric price, household income, and weather.

EKPC uses a statistically adjusted end-use ("SAE") model to forecast residential energy use. This model requires detailed information about appliance saturation levels and efficiencies, household characteristics, weather, demographic, and economic information. While preserving the end-use forecast elements of EKPC's previous end-use model, the SAE also employs time series analysis and segments the average household usage into end-use components. In this model, usage is modeled as a function of heating, cooling variables, water heating, and other sectors. These variables are defined in terms of their respective end-use structure. Annual end-use indices and a usage variable define each of these variables. Usage, in turn is a function of economic and weather related conditions.

Once the preliminary forecasts are complete, EKPC meets with each coop to discuss its individual forecast. EKPC will revise the member system's forecast based upon mutual agreement between its staff and the coop's management and staff. A final forecast is prepared and subsequently approved by each member system's board of directors. EKPC's 20 year forecast is the sum of the individual coop final forecasts.

The coops provide essential input into EKPC's forecasting process. The individual coops provide input on the status of local economic conditions and development. Meetings between EKPC and the coops provide opportunities to critique EKPC's modeling assumptions and forecasting results. Thus, EKPC's load forecast is a combination of a structured forecast modeling tempered by the coop's judgment and specific service area experience.

EKPC has divided its service territory into seven economic regions, each of which has its own specific regional economic forecast. The U.S. Bureau of Labor Statistics and the Bureau of Economic Analysis provide quarterly county level historical data on population, income, employment, and wages. County level labor force and unemployment rates are collected from state sources. EKPC's contractor, Global Insight, supplies forecasted U.S. economic data to help drive the model as well. Specific regional forecasts for population, income, and employment are developed and used as inputs in the energy forecast and the residential and small commercial class forecasts. Population forecasts are used to project the number of residential customers. Regional household income is used to project residential sales and regional economic activity is the driver for small commercial sales. EKPC converts quarterly economic data from its regional economic model to monthly data for use in its specific load forecasting models.

Residential energy sales, which make up about 60 percent of total member system retail sales, are forecast using regression techniques. Regression inputs include electric price, economic activity, changes in household size, and regional population growth. The latter is also obtained using regression techniques. Small commercial customers are defined as having an annual peak demand of less than 1 MW. In 2005, there were over 30,000 small commercial customers throughout EKPC's system. Small commercial energy sales are also forecast using regression techniques. Inputs to this regression equation include regional economic variables, electric price, and the residential customer growth forecast.

Large commercial customers are defined as having an annual peak demand of greater than 1 MW. In 2005 there were 139 retail large commercial customers on the EKPC system. The large commercial sales forecast is generated by input from the individual member systems in conjunction with a modeling approach. The member systems project existing large loads and any new customers while EKPC projects total new large loads at the system level using a regression approach. Usage for the large commercial class is a function of historical development, industrial parks and local economic conditions. A probabilistic approach is used to then distribute forecasted new large commercial customers to each of the member systems based on regional

economic outlook, share of county served, and historical success in attracting new large customers. All new large customers are assumed to have the same energy characteristics as the average of all large customers, i.e., a peak of 1.5 MW with a 60 percent load factor.

Seasonal energy sales are to customers with seasonal residences and weekend retreats. Only two member systems track and report seasonal sales. The public building sales forecast includes accounts such as government buildings and libraries. Only two member systems track and report such sales. The "other" sales category mainly represents street lighting and is usually projected as a function of residential sales. Eleven member systems report street lighting. Summing monthly energy usage and load factors for the various customer classes projects seasonal peak demands. The primary residential energy sales usage components include heating, cooling, and water heating. Load factors are used to calculate demand for each component and summed to obtain the residential portion of seasonal peak demand. For the small and large Commercial classes, class load factors are used to obtain the relative portions of seasonal peak demand.

Results

When EKPC conducted its load forecasts, it anticipated that Warren RECC would be joining its system as of April 1, 2008.[2] EKPC's total system requirements were forecast to increase by 3.0 percent per year through 2026. The net winter peak demand would increase by approximately 2,400 MW to 4,869 MW. The net summer peak was forecast to increase by about 1,700 MW to 3,853 MW. System peak forecasts assume that 128 MW of interruptible load had been interrupted. Total system energy requirements were projected to increase from 12,527,829 MWh to 22,475,651 MWh, which represents a 3.0 percent annual increase. The system load factor was forecast to remain largely unchanged at about 53 percent.

EKPC also ran scenarios that excluded the additional load and energy requirements of Warren RECC. The impact of excluding Warren RECC can be seen in the projected growth rates. When Warren RECC is excluded from the 2026 forecast, the total energy requirement growth rate declines from 3.0 percent to 2.3 percent per year. Similarly, the firm winter peak demand growth rate declines from 3.2 percent to 2.6 percent. The firm summer peak demand growth rate declines from 3.0 percent to 2.3 percent. While excluding Warren RECC decreased the overall energy growth rate by 0.7 percent per year, the effect on the primary customer classes is more variable. The energy requirement growth rate for the residential class declines from 2.9 percent to 2.4 percent per year. The small commercial class declines from 3.1 percent to 2.4

[2] Warren RECC had previously served notice that it would switch purchasing wholesale power for distribution from TVA to EKPC effective April 1, 2008. However, in December 2006 WRECC announced that it would not be joining EKPC as a member co-op and would, instead, remain a TVA customer.

percent per year and the large commercial sales class declines from 4.0 percent to 2.6 percent per year.

There are three major differences between the forecast in EKPC's previous IRP and the 2006 forecast in this IRP. First, Gallatin Steel, with 120 MW of load which can be interrupted, is assumed to be interrupted for 360 hours each year in the 2006 forecast, versus 500 hours in the prior forecast. Second, the end-use survey indicates that electric furnace saturation is higher than in the prior forecast. Finally, even with the addition of Warren RECC, household formation has slowed relative to the earlier forecast. EKPC provided a chart with selected statistical comparisons between the two forecasts out to 2017. In 2017, the 2006 forecast projects 30,745 fewer residential customers and 1,053,334 MWh less in residential sales than the previous forecast. The 2006 firm winter peak and summer peak demand forecasts are 274 MW and 295 MW lower, respectively, than in the prior forecast.

Uncertainty Analysis

In 2002, EKPC began using Metrix LT software to build its hourly load forecast for the whole system. EKPC provided a forecasting flow diagram to illustrate the peak demand forecasting process. System hourly load shapes are determined from actual historical load data. The system forecast is obtained by summing the member systems' forecasts. Class energy demand forecasts, as well as winter and summer peak demands are also summed from the members' forecasts. These are used to create an hourly load model of the forecasted years. Assuming normal weather, the hourly load forecast is then calibrated to the seasonal peak demands and annual energy forecasts to build a calibrated hourly load forecast for the EKPC system. This constitutes the base case scenario. High and low case scenarios are constructed using the same methodology. However, instead of using summed member system forecasts, new models are constructed that will reflect both higher and lower usage for the member systems.

There are five categories where different assumptions are made that affect electricity demand: weather, electricity prices, population, number of households and household size, and residential appliance saturation projections. For weather, two standard deviations above and below the base case heating and cooling degree days are assumed for the high and low cases. Electric price is also assumed to vary 15 percent lower, which results in higher usage, and 15 percent above, which results in lower usage, than the base case rate for the high and low cases. The number of residential customers is also assumed to vary by two standard deviations above and below the base case scenario annual average residential customer count. For the small and large commercial classes, customer and energy high and low forecasts are made using probabilistic modeling using @RISK software. Once annual energy and seasonal peaks are prepared, the process of calibrating the hourly load curves is the same as before.

Discussion of Reasonableness and Recommendations

EKPC's forecasting methodology and processes appear sound. Descriptions of the models offer a good conceptual framework of the methodology. Although this IRP reflects overall improvement compared to EKPC's previous IRP, the descriptions are too general for the reader to fully understand each model. EKPC provided a list of the five major assumption changes that were used to produce the high and low cases for its uncertainty analysis. However, the discussion of how assumptions were manipulated to produce the high and low case scenarios for seasonal peak demand, while improved over the prior IRP, is too general in nature. For the next IRP, a more complete discussion and description of each model should be included along with a description of how data and variables were manipulated and constructed for each model. Specific recommendations (which, to some extent, are carried from the prior staff report) are as follows:

- Provide a more complete description of each model, component and variable for each model including the class models, regional economic model, peak models and the high / low variation in peak demand.

- Provide a complete description of how the economic and demographic data is constructed for the seven economic regions, including how the data is manipulated so as to be useful for forecasting individual member system class usage.

- Provide a complete description of what assumptions are made and how they are manipulated to produce the high and low case variations in the seasonal peak demand forecasts.

- Provide an expanded discussion comparing the 2006 load forecast with the forecasts supporting the next IRP. Specifically, include a comparison of how assumptions and inputs (major drivers) in the models changed after it became apparent that Warren RECC would not join the EKPC system and how the generation that would have supported the Warren RECC load was then needed for existing customers.

SECTION 3

DEMAND SIDE MANAGEMENT

Introduction

This section discusses the DSM component of this IRP. EKPC identified 9 existing DSM programs which it and its members offer to its members' end-use customers. This IRP contains an evaluation of EKPC's existing DSM programs and of new programs that have been analyzed in conjunction with the preparation of the IRP. The existing DSM programs offered by EKPC and its member cooperatives are:

1. Tune-Up HVAC Maintenance Program
2. Geothermal Heating & Cooling Incentive Program
3. Electric Thermal Storage Propane Program
4. Electric Thermal Storage Furnace Program
5. Electric Water Heater New Construction Program
6. Electric Water Heater Retrofit Program
7. Air-Source Heat Pump New Construction Program
8. Air-Source Heat Pump Retrofit Program
9. Button-Up Weatherization Program

The IRP includes program descriptions, discussion of target markets and load impact tables for existing programs. EKPC believes this IRP includes a broader and stronger DSM program analysis than its previous IRP. This belief reflects the comprehensive list of 93 DSM measures which were considered as resource options. This list was developed after EKPC's review of (1) Staff's recommendations on EKPC's 2003 IRP, (2) feedback from the Attorney General's ("AG") office and other state agencies, (3) current DSM programs of other Kentucky utilities, and (4) DSM best practices by electric utilities nationwide.

Existing Programs

The IRP includes benefit/cost analyses of existing DSM programs using the traditional "California Tests."[3] For three programs, Electric Water Heater Retrofit, Air-Source Heat Pump New Construction, and Air-Source Heat Pump Retrofit, the results of the Total Resource Cost ("TRC") test were less than 1.0, meaning that costs exceeded benefits. When questioned about these results and its future plans for these programs, EKPC stated that these are all mature programs offered by its members and that it and its cooperatives were aware of the programs' eroding benefit/cost ratios. It also described the factors that had contributed to this erosion and indicated that it and its members were carefully examining the best course of action to pursue given these test

[3] California Public Utilities Commission and California Energy Commission, "Standard Practice Manual for Economic Analysis of Demand-Side Management Programs," Document Number P400-87-006, December 1987.

results. For its existing programs, EKPC projects, future demand reductions of 58.7 MW to its winter peak and 14.75 MW to its summer peak.

In addition to the existing programs listed herein, EKPC and its members offer the Touchstone Energy Star Home and Touchstone Energy Star Manufactured Home programs, which provide rebates to consumers who purchase and/or construct homes which meet federal Energy Star efficiency standards.[4] These programs qualify as DSM programs; however, to date, EKPC has offered them as customer service programs and has not previously subjected them to the benefit/cost evaluations of its other existing programs.

New DSM Programs

EKPC's DSM analysis consists of two steps to evaluate DSM resources for possible inclusion as new DSM programs in its IRP. Step one, qualitative screening, a qualitative assessment of a large number of DSM measures, covers all customer classes and includes a robust group of technologies and strategies for producing energy and capacity savings. In this assessment, each measure is evaluated against four criteria: (1) customer acceptance; (2) measure applicability; (3) savings potential; and (4) cost effectiveness. EKPC evaluated 93 DSM measures in its qualitative screening process. Out of a possible score of 20 under the four criteria, measures which scored 15 or higher were passed on to the more rigorous second step, quantitative evaluation.

Thirty-four DSM measures passed the qualitative screening process to be considered for further analysis in the quantitative evaluation process. In its quantitative evaluation, EKPC utilized DSManager, a computer program created by the Electric Power Research Institute ("EPRI"), an electric industry research group, to compute the benefit/cost ratios for the 34 measures. In several cases, measures were combined so that a total of 27 DSM programs were included in the quantitative evaluation. Relying primarily on the TRC test, EKPC's evaluation produced 24 programs with benefit-cost ratios greater than 1.0. 18 of the 24 are new programs not previously implemented by EKPC.

The 18 new programs are listed below:

1. Compact Fluorescent Lighting
2. Touchstone Energy Geothermal Heat Pump Home
3. Touchstone Energy Home with Air Source Heat Pump
4. Touchstone Energy Manufactured Home
5. Direct Load Control for Air Conditioners and Water Heaters
6. Energy Star Clothes Washer

[4] The Energy Star Home Program is approved to operate through 2009. EKPC has an application pending in Case No. 2007-00266 requesting to extend the Energy Star Manufactured Home Program through 2009 as well.

7. Energy Star Room Air Conditioner
8. Energy Star Refrigerator
9. Programmable Thermostat with Electric Furnace Retrofit
10. Dual Fuel Air Source Heat Pump with Propane Retrofit
11. Commercial Lighting
12. Commercial and Industrial Demand Response
13. Commercial Efficient HVAC
14. Commercial Building Performance
15. Commercial New Construction
16. Commercial Efficient Refrigeration
17. Industrial Premium Motors
18. Industrial Variable Speed Motors

EKPC's analysis, based on TRC test results, projects net benefits of $157 million over a period of 20 years with a total investment in the new DSM programs by EKPC, its member cooperatives, and end-use customers of approximately $50 million to achieve those benefits. It also projects, over a 15-year period, demand reductions of 87 MW to its winter peak and 107.5 MW to its summer peak.

One notable change from the information included in its prior IRPs is the degree to which EKPC factored environmental cost considerations into its DSM evaluation process. EKPC recognized the following three categories of environmental costs: (1) allowances purchases – which were reflected in marginal energy costs; (2) capital investments for compliance – these were reflected in marginal capacity costs; and (3) externalities – which were reflected in an adder of $10 per MWh used in the Societal Cost test. The $10 per MWh adder was based on allowance prices in various international markets that have cap and trade policies for carbon already in place.

Comments of the Attorney General

The AG commended the scope of EKPC's DSM analysis. However, he noted that no sensitivity analysis was performed for various levels of DSM to determine if an aggressive approach could eliminate the need for supply options. The AG criticized EKPC for not considering DSM as an environmental compliance option.

The AG also criticized EKPC for not including the impacts of new programs in its load forecast to determine its capacity needs. He stated that EKPC does not fully incorporate DSM into its planning process and that it missed opportunities to fully realize the benefits of DSM.

Discussion of Reasonableness

Staff made three specific recommendations concerning DSM in its report on EKPC's 2003 IRP that were used by EKPC as a foundation for the analysis of DSM activities in its 2006 IRP. Those recommendations were:

- Discuss the results of any dialogue EKPC has with the AG, the Kentucky Department of Energy ("KDOE"), or other parties related to DSM issues prior to filing the IRP, and explain how the parties' concerns are incorporated in the IRP.

- Report on efforts to evaluate and support local integrated resource planning, cogeneration and distributed generation, and other initiatives of the type advocated by KDOE.

- Explicitly discuss how it has factored environmental cost considerations into its DSM evaluation or, at minimum, provide an explanation for why it has not or cannot do so.

The IRP clearly reflects EKPC's efforts to engage the AG and other relevant agencies in addressing issues that were raised in its previous IRP as part of this IRP filing. We note that the AG offered no criticisms of the manner in which EKPC took his prior suggestions into consideration.

The IRP includes discussion of EKPC's cogeneration tariff, distributed generating facility, landfill gas generating units, and the development of its member cooperatives' net metering tariffs. The IRP also takes note that EKPC and two of its members are engaged in a direct load control demonstration project based on item 5 of the new DSM programs listed earlier in this section.

As stated previously, EKPC has explicitly factored environmental costs into its DSM evaluation process in the form of allowance purchases, capital investments for environmental compliance, and externalities based on carbon allowance prices in various international markets.

Regarding the AG's comments, Staff is encouraged by the breadth and scope of EKPC's DSM analysis. We strongly recommend that EKPC and its member cooperatives aggressively pursue implementation of the DSM programs which passed both the qualitative screening and quantitative evaluation processes.

As to the AG's comments, the Staff shares some of his concerns. We agree with the AG that sensitivity analyses should be performed on potential DSM programs to measure the extent to which their implementation may be affected by changes in the assumptions on which their selection was based.

In light of the ever-increasing environmental limits under which utilities operate, and under which they are expected to operate in the future, Staff concurs with the AG that DSM, in addition to being considered a resource option, should also be considered an environmental compliance option. Such consideration could possibly enhance the value of DSM as an alternative to additional supply-side resources. In addition, as actions at the federal level provide greater certainty concerning carbon emissions policies, Staff suggests that EKPC include explicit discussion in its next IRP of its plans for managing carbon emissions.

Staff does not agree with the AG that estimated load impacts of new programs must be included in EKPC's load forecast. In our opinion the uncertainties surrounding whether new programs will ultimately be implemented makes it too speculative to recognize their load impacts in load forecasts on which decisions regarding future resource additions will be based. In addition, the AG's proposed inclusion would not be in compliance with 807 KAR 5:058, Section 7(3).[5] We do, however, believe the estimated load impacts of such programs should be included in EKPC's load forecast sensitivity analysis. Furthermore, once the decision has been made to implement a new DSM program, Staff is of the opinion that the program's estimated load impact should be recognized in EKPC's load forecast.

Based on this discussion, Staff's specific recommendations for the DSM component of EKPC's next IRP are as follows:

- Continue to evaluate and pursue DSM opportunities to the same extent and scope as reflected in this, EKPC's 2006 IRP.

- Consider DSM as an environmental compliance option in addition to a resource option or, at minimum, explain why it has not or cannot do so.

- Based on federal actions at the time, EKPC should include explicit discussion in its next IRP of its plans for managing carbon emissions.

- Based on the extent to which "new" DSM programs are being implemented, reflect their estimated load impacts in EKPC's load forecast or, in the alternative, in the sensitivity analyses, of its load forecast.

[5] 807 KAR 5:058, Section 7(3) provides that:

> For each of the fifteen (15) years succeeding the base year, the utility shall provide a base load forecast it considers most likely to occur and, to the extent available, alternate forecasts representing lower and upper ranges of expected future growth of the load on its system. Forecasts shall not include load impacts of additional, future demand-side programs or customer generation included as part of planned resource acquisitions estimated separately and reported in Section 8(4) of this administrative regulation. Forecasts shall include the utility's estimates of existing and continuing demand-side programs as described in subsection (5) of this section.

SECTION 4

SUPPLY-SIDE RESOURCE ASSESSMENT

Introduction

This section summarizes, reviews, and comments on EKPC's evaluation of existing and future supply-side resources. It also includes discussion on various aspects of EKPC's environmental compliance planning.

Existing Capacity

EKPC owns and operates 1,655 MW of coal-fired, base load capacity, at three sites, consisting of nine generating units. With respect to peaking capacity, EKPC owns 842 MW of duel-fueled, gas and oil, combustion turbines ("CTs"), consisting of seven generating units located at its Smith generating facility. EKPC's existing capacity is shown below in Table 1.

TABLE 1 – EXISTING CAPACITY

Plant Name	Unit Number	Net Capacity (MW)	Facility Type	Fuel Type
Dale Station	1	23	Steam	Coal
	2	23	Steam	Coal
	3	75	Steam	Coal
	4	75	Steam	Coal
Cooper Station	1	116	Steam	Coal
	2	225	Steam	Coal
Spurlock Station	1	325	Steam	Coal
	2	525	Steam	Coal
	Gilbert	268	Steam	Coal
Smith Station	1	150	CT	Gas/Oil
	2	150	CT	Gas/Oil
	3	150	CT	Gas/Oil
	4	98	CT	Gas/Oil
	5	98	CT	Gas/Oil
	6	98	CT	Gas/Oil
	7	98	CT	Gas/Oil
TOTAL		**2497**[6]		

[6] EKPC has received Commission approval to construct an additional 556 MW of base load capacity and 180 MW of peaking capacity over the period 2009-2011.

In addition to the capacity shown in Table 1, EKPC owns and operates roughly 15 MW of generating capacity at 5 landfill gas operations in central and eastern Kentucky.[7] It also has up to 170 MW of hydropower available on a long-term basis through a purchased power contract with SEPA. EKPC's projected capacity needs (winter in the left-hand column / summer in the right-hand column) for 2006 through 2020 are shown in Table 2 below.

TABLE 2 – PROJECTED CAPACITY NEEDS (MW)

Year	Projected Peaks		12 Percent Reserves		Total Requirements		Existing Resources		Capacity Needs	
2006	2,673	2,151	321	258	2,994	2,409	2,752	2,543	242	-134
2007	2,773	2,213	333	266	3,105	2,479	2,719	2,505	386	-26
2008	2,848	2,643	342	317	3,190	2,960	2,721	2,505	469	455
2009	3,346	2,721	401	327	3,747	3,048	2,693	2,477	1,054	571
2010	3,439	2,791	413	335	3,851	3,126	2,683	2,467	1,168	659
2011	3,520	2,852	422	342	3,942	3,194	2,683	2,467	1,259	727
2012	3,595	2,907	431	349	4,027	3,256	2,683	2,467	1,344	789
2013	3,694	2,978	443	357	4,137	3,335	2,683	2,467	1,454	868
2014	3,775	3,036	453	364	4,228	3,400	2,683	2,467	1,545	933
2015	3,856	3,096	463	372	4,318	3,467	2,683	2,467	1,635	1,000
2016	3,931	3,153	472	378	4,403	3,531	2,683	2,467	1,720	1,064
2017	4,031	3,225	484	387	4,515	3,612	2,683	2,467	1,832	1,145
2018	4,118	3,290	494	395	4,612	3,685	2,683	2,467	1,929	1,218
2019	4,209	3,359	505	403	4,714	3,762	2,683	2,467	2,031	1,295
2020	4,299	3,423	516	411	4,814	3,834	2,683	2,467	2,131	1,367

Reliability Criteria

EKPC's most recent planning reserve margin study indicates that a 12 percent reserve margin over the system's annual peak demand is the optimal reserve margin for reliably serving its member systems. Since its previous IRP, EKPC has changed the manner in which it meets its annual peak demand, which occurs in winter. In the past, EKPC planned to own and operate sufficient capacity to meet its summer peak while it purchased power on the wholesale market to cover the additional increment of demand incurred at the time of its winter peak. EKPC has changed its practice so that it now plans on owning and operating sufficient capacity to meet its winter peak demand. This

[7] The last of these 5 landfill gas facilities began operation after EKPC filed its IRP.

change, which will make EKPC less dependent on the wholesale power market in the winter months, was implemented due to increases in recent years in both the magnitude and volatility of wholesale winter electric prices.

Supply-Side Resources

EKPC relies on EPRI's Technical Assessment Guide-Supply Side Technologies Software for use in detailed cost information as well as estimates based on current projects. It used Simtec Inc.'s RTSim to produce its optimal resource expansion plan. The Simtec resource optimizer evaluated a variety of resource options, startup dates, and market and load conditions in simulating 3,500 different plans. The resource optimizer then further analyzed the 5 lowest cost expansion plans. The different supply side capacity alternatives considered by EKPC were as follows:

1. Combustion turbines
2. Combustion turbines with steam injection option
3. Fluidized bed boiler units
4. Subcritical pulverized coal
5. Long term purchases to be evaluated in request for proposals as needed

At the time it filed its IRP, Warren RECC was scheduled to become a member of EKPC in April 2008. Shortly after EKPC filed its IRP, Warren RECC announced that it would remain on the TVA system rather than become a member of EKPC. Based on the results produced by the resource optimizer, Table 3 shows EKPC's projected major capacity additions that are needed from 2006 through 2020 to serve its 16 member distribution cooperatives.

TABLE 3 – PROJECTED MAJOR CAPACITY ADDITIONS (MW)		
Year	Base load Capacity	Peaking/Intermediate Capacity
2006		
2007		
2008		
2009	278 (Spurlock 4)	196 (Smith CTs 8-9)
2010		
2011	278 (Smith CFB)	98 (Smith CT 10)
2012		98 (Smith CT 11)
2013		98 (Smith CT 12)
2014		
2015		
2016		100
2017	300	
2018		
2019		
2020		100

EKPC did not explicitly model supercritical pulverized coal-fired units in the IRP, stating that it would perform a more detailed evaluation of supercritical units in the future. In response to a Staff data request, EKPC stated that it would perform a detailed evaluation of such units in developing self-build options for its next RFP seeking supply side resources.

Compliance Planning

EKPC must comply with the requirements of the Clean Air Act, as amended, in addition to the requirements of more recent federal environmental legislation such as the Clean Air Interstate Rule ("CAIR") and the Clean Air Mercury Rule. The CAIR was issued in 2005 and establishes new standards for annual reductions of SO_2 and NOx emissions.

EKPC has installed selective catalytic reduction systems ("SCR") on Spurlock Units 1 and 2, which substantially reduce NOx emissions, in order to comply with federal emissions regulations. It plans to add flue gas desulfurization units ("scrubbers") to Spurlock Units 1 and 2 by 2009 to reduce SO_2 emissions prior to the start of phase I of the CAIR SO_2 reduction program, which begins January 1, 2010.

Dale Station and Cooper Station are the oldest generating facilities on the EKPC system. In order to meet future system emission limits, changes may be required at these facilities. It is projected that a single scrubber could be installed to capture SO_2 from both generating units at the Cooper Station. An SCR is projected to be installed on Cooper Unit 2 for NOx control. EKPC is studying the best strategy for reducing emissions from the generating units at both the Dale and Cooper stations. Alternatives under consideration include fuel switching, emission control equipment, repowering, and retirement. At the time it filed its IRP, EKPC stated that it had no plans to retire any of its generating units.

Intervenor Comments

The AG believes that EKPC needs to improve its process of identifying and screening supply side options. EKPC considered three base load and two peaking alternatives in the optimization model, but not all possible supply-side resource technologies. The AG recommends that a reasonable supply-side resource identification process should include review of generation technology information from trade journals, vendor brochures, power engineering magazines, and environmental research organizations.

The AG recommends that EKPC incorporate transmission options more thoroughly into the resource planning process. According to the AG, EKPC is constructing transmission lines to mitigate some of its transmission constraints. However, several bottlenecks remain within EKPC's system and in neighboring systems that could limit its ability to import power. The AG expressed concern that no explanation was provided for whether and how to remove these transmission constraints. The AG expressed further concern that EKPC has not conducted transmission investment planning that would affect its ability to import power and increase its resource choices.

Discussion of Reasonableness

In EKPC's prior IRP, Staff made five specific recommendations concerning supply side resources. Those recommendations were:

- EKPC should include an analysis in its next IRP on what planning reserve margin is optimal. In addition to regional capacity or reserve margins, this analysis should be based upon probabilistic criteria such as loss of load expectation or probability, the size of its largest generating unit, forced outage rates, import capability, ECAR operating reserve requirements, etc. In the alternative, if EKPC believes that these criteria are inappropriate, it should explain why.

- EKPC's next IRP, scheduled to be filed in the spring of 2006, should reflect its plans for serving its growing system demand, including the addition of Warren RECC.

- In its next IRP, EKPC should provide more discussion about the supply alternatives it selects to analyze. This discussion should identify all criteria, assumptions, etc. relied upon in making these selections and explain the basis for the criteria, assumptions, etc.

- EKPC should consider using methods, such as described above, or other methods, to levelize or otherwise mitigate the effects that very "lumpy" investments have in studies of this type.

- EKPC should carefully evaluate the potential of the Gilbert Unit to burn a mix of wood waste and coal. It should also consider carbon dioxide emissions, or the absence thereof, when evaluating hydro generation options.

EKPC responded to all of the Staff recommendations, to one degree or another. It adequately addressed the matter of its reserve margin analysis. It extensively dealt with issues related to the addition of Warren RECC, but was required to revise its plans once Warren RECC decided not to join the EKPC system. EKPC provided thorough discussion of the supply alternatives it included in its analysis of supply side technologies. Also, it addressed the manner in which it could mitigate the effects of "lumpy" investments in generation capacity. While it generally considered emissions issues, EKPC's IRP did not explicitly reflect that it had evaluated the potential of the Gilbert Unit to burn a mix of wood waste and coal. Given that one of the benefits of coal-fired fluidized bed technology is the ability to burn lower quality coals or a mix of coal and various waste products, EKPC should more explicitly evaluate the extent to which its CFB units can burn other types of fuel, in addition to coal.

Recommendations

EKPC did not file any reply comments to the AG's comments. Based on the information contained in the IRP, EKPC's data responses, and the AG's comments, Staff recommendations are as follows:

- EKPC should expand its universe of supply side options in preparing its next IRP, as the AG suggests. It should specifically follow-up on its response that it will perform a detailed evaluation of supercritical coal-fired units in developing self-build options in conjunction with its next RFP for supply side resources.

- EKPC should address in detail in its next IRP the AG's comments concerning its transmission system constraints.

SECTION 5

INTEGRATION AND PLAN OPTIMIZATION

Introduction

The last step in the IRP process is to integrate supply-side and demand-side options to arrive at an optimal integrated resource plan. This section discusses EKPC's integration of supply-side and demand-side options and its resulting plan.

Integration Process

The final part of EKPC's development of its IRP involves evaluating the Net Present Value ("NPV") of revenue requirements for several alternative plans. As a cooperative, EKPC's criterion is to minimize its member systems' revenue requirements given a target times interest earned ratio ("TIER"). Based on a series of uncertainty analyses, the plans are ranked with the plan that is least cost under the greatest number of scenarios being chosen as the optimal resource plan.

EKPC based its resource expansion plan on its most recent load forecast and a 12 percent planning reserve margin. As discussed in Section 4 of this report, EKPC has changed its practice for meeting its peak system (winter) demand in that it now plans on building and operating sufficient capacity to meet its peak winter demand. Previously, EKPC built capacity to meet its summer peak and purchased blocks of power from the wholesale market to meet its winter peak.

EKPC used the Simtec RTSim model to select its optimal resource expansion plan. The Simtec resource optimizer evaluated several resource options, startup dates, and market and load conditions to produce the lowest cost expansion plans. Based on the different supply side capacity alternatives considered, as discussed in Section 4 of this report, EKPC analyzed in detail the 5 lowest cost plans produced by the resource optimizer after it simulated more than 3,000 different plans.

The plan EKPC originally selected, as reflected in its IRP filing, was based on the addition of Warren RECC to its system in 2008. Subsequently, based on Warren RECC's decision to remain with TVA, EKPC modified its plan as reflected in Section 4 of this report. The modifications for peaking capacity additions through 2009 and base load capacity additions through 2011 were originally considered and approved by the Commission in Case Nos. 2004-00423 and 2005-00053. Subsequent to the announcement by Warren RECC that it was not joining the EKPC system, the Commission reconsidered and modified its approvals in Case No. 2007-00564.

Given the uncertainties in various planning inputs, such as fuel prices and load growth, it is important to evaluate whether a given plan can be adapted to deal with a large number of changes that may result from such uncertainties. In its evaluation, EKPC considered the most significant uncertainties that might affect the outcome of the

different plans. The uncertainties were: high and low fuel costs and market prices; and high and low load forecasts. The results of the uncertainty analyses provide EKPC with information to develop strategies to mitigate the impacts of changes to the inputs that were considered.

Intervenor Comments

As discussed in Section 3 of this report, the AG commends the scope of EKPC's DSM analyses. However, he contends that the analysis is not integrated with supply-side resource options in EKPC's optimization process. He notes that no sensitivity analysis was performed for various levels of DSM to determine if an aggressive approach could eliminate the need for supply options. The AG also criticizes EKPC for not considering DSM as an environmental compliance option.

EKPC considered three base load and two peaking alternatives in the optimization model, but it did not consider all possible supply-side resource technologies. The AG believes that EKPC needs to improve its process of identifying and screening supply side options.

Updated Information

In addition to the decision by Warren RECC to remain on the TVA system and not become a member of the EKPC system, a number of other events have occurred since the filing of EKPC's IRP that will likely affect its future planning decisions. Those events are:

After filing its IRP, EKPC reached settlements with the federal government on two lawsuits alleging that it violated certain provisions of the Clean Air Act. The settlements, with the U.S. Department of Justice and the U.S. Environmental Protection Agency, include provisions requiring EKPC to install emissions reducing equipment at various generating units under schedules prescribed in the settlements. Much of the equipment will be installed at the Dale and Cooper stations. In addition, EKPC will be subject to strict limits on the purchase, sale and transfer of emissions allowances under the terms of the settlements.

In Case No. 2006-00547, the Commission approved the extension of the rebate provision of EKPC's Touchstone Energy Star Homes program through 2009. However, the Commission decided that EKPC's maximum rebate would be reduced from $500 to $250 based on the level of rebates EKPC had provided since the inception of the program and concerns about EKPC's overall financial condition.

In Case No. 2007-00266, EKPC filed a request to extend and modify the Touchstone Energy Star Manufactured Homes program. As of the date of this report, that case was still pending before the Commission, although a decision is expected in the near future.

In April of 2007, in Case No. 2006-00472, EKPC was awarded a rate increase of $19 million, on an interim basis, to address concerns about its financial condition. In December of 2007, this amount was confirmed as the permanent increase EKPC would be awarded, although it had requested an overall permanent increase of $43.5 million.

Discussion of Reasonableness

As stated earlier, the AG expressed concern as to the extent to which DSM is, or is not, properly integrated into EKPC's resource planning process. Generally, the Staff shares the AG's concerns. It is imperative that DSM alternatives be on a "level playing field" so as to be analyzed in a manner consistent with the way in which supply-side options are analyzed. We also agree with the AG that sensitivity analyses should be performed on potential DSM programs in order to measure the extent to which their implementation may be affected by changes in the assumptions on which their selection was based.

As stated in Section 3 of this report, EKPC's DSM analysis was much greater in both breadth and scope than its previous DSM analyses. Staff believes that EKPC and its member cooperatives should aggressively pursue implementation of the programs which passed through to the end of its evaluation processes.

Based on this discussion, Staff's recommendations for EKPC's next IRP filing are as follows:

- EKPC should more fully integrate the analyses of potential DSM programs into the optimization process of its IRP so that DSM is considered, to the greatest extent possible, in the same manner as supply-side resources.

- EKPC's next IRP should explicitly discuss its actions to date and actions it will take in the future in order to comply with the terms of the settlements it reached with the U.S. Department of Justice and the U.S. Environmental Protection Agency regarding alleged violations of various provisions of the Clean Air Act.

Under the section "Updated Information" above, circumstances related to EKPC's financial condition and its requirement to comply with the terms of the settlements with the federal government add to the uncertainty of its future planning. However, EKPC's next IRP should address all the recommendations contained in Sections 2 through 4 of this report, as well as the recommendations contained in this section.