BEFORE THE STATE CORPORATION COMMISSION

OF THE STATE OF KANSAS

DIRECT TESTIMONY

OF

MICHAEL K. ELENBAAS

WESTAR ENERGY

DOCKET NO. 08-WSEE-309-PRE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Michael K. Elenbaas, 11401 Lamar, Overland Park, KS 66211.

Q. BY WHOM AND IN WHAT CAPACITY ARE YOU EMPLOYED?

A. I am employed by Black & Veatch Corporation (B&V). I am currently assigned to the Company's Enterprise Management Solutions Division, where I serve as a Senior Consultant.

Q. PLEASE DESCRIBE B&V.

A. B&V has provided comprehensive construction, engineering, consulting, and management services to utility, industrial, and governmental clients since 1915. The company specializes in planning, engineering and construction associated with the utility industry including electric, gas, water, wastewater, telecommunications, and waste disposal. Engagements consist principally of design and construction, feasibility analyses, planning studies, rate and financial reports, appraisals, reports on operations, management studies, and general consulting services. Present engagements include work throughout the United States and numerous foreign countries. Including personnel assigned to affiliated companies, B&V currently has a staff of more than 9,000 people.

Q. PLEASE DESCRIBE YOUR EDUCATION AND BUSINESS EXPERIENCE.

A. I am a graduate of Dordt College with a Bachelor of Science Degree in Engineering. I have worked continuously for B&V since earning my degree in 2000.

I began my association with Black & Veatch working in the Company's Energy Services Division. In 2003, my work group was transferred to the Company's Enterprise Management Solutions Division. For the past eight years, I have developed and prepared Power Supply Plan Studies and Financial Analyses for electric utilities, major industrial customers, and institutional facilities. These studies and analyses include developing short and long term power supply plans, wholesale electric market price forecasting, and strategic planning.

As a senior consultant, I provide management consulting and project management services to electric, gas, and water utilities. These services have included power supply planning, developing testimony and analysis in support of utility rate and other cases, assisting utilities with prioritizing their capital improvement programs, and performing strategic planning and financial risk analyses. I have managed and assisted with power supply planning related consulting services to over 20 utilities in the United States. In aggregate, these utilities own and operate over 70,000 MW of generating capacity.

Q. FOR WHOM ARE YOU TESTIFYING IN THIS MATTER?

A. I am testifying on behalf of Westar Energy, Inc. (Westar).

Q. PLEASE SUMMARIZE YOUR DIRECT TESTIMONY?

A. I will summarize the previous planning studies conducted by B&V on behalf of Westar since 2000. I then describe the results of the studies I conducted in 2007 that relate to the wind turbine additions under consideration in this docket.

Q. PLEASE DESCRIBE B&V'S INVOLVEMENT IN POWER SUPPLY PLANNING FOR WESTAR PRIOR TO 2007.

A. In 2000, we developed a number of key inputs to Westar's then long-term power supply plan. These inputs included estimates of capital and operating costs of alternative power supply resources; identification and prioritization of candidate sites for new baseload, intermediate and peaking resources; and analyses of potential transmission upgrade costs associated with locating new generation at candidate generating plant sites.

In 2003 and 2004, we developed a comprehensive long-term power supply plan in conjunction with a plan to comply with pending environmental regulations.

In 2005 and 2006, under my supervision and direction, we assisted Westar with updates to the power supply plan. In our 2005 work, we updated key assumptions such as fuel prices and capital costs and added consideration of the effects of the purchase of the Spring Creek Plant. In 2006, we updated the comparison of key power supply plan revenue requirements to account for the latest fuel price, electric market price, capital cost, and load growth assumptions, and to include the latest assumptions for the Emporia Energy Center addition.

Q. WHAT WERE THE OUTCOMES OF THESE STUDIES?

A. The 2003/2004 study indicated that Westar should add 750 MW of peaking combustion turbines (CTs) beginning in 2008 and a large combined cycle (CC) or baseload pulverized coal (PC) plant in 2014 assuming continued sales to existing retail and wholesale customers. The risk of higher natural gas prices favored the addition of a baseload coal unit.

Between our 2003/2004 study and our 2005 update, natural gas prices increased dramatically. As a result our forecast natural gas prices were considerably higher in our 2005 update than in our 2003/2004 studies. In the 2005 update, we confirmed the need for baseload generating capacity in 2014 and the need for CTs to meet peaking power and reserve requirements prior to 2014. The addition of CTs prior to 2014 and the addition of a large baseload generator in 2014 were common elements of the low cost plans in all the earlier analyses.

In the 2005 analysis, we included the Spring Creek plant as an option compared to building new capacity. That comparison indicated that the purchase of the Spring Creek Plant, given its low acquisition cost, should result in lower revenue requirements compared to building new peaking capacity. While the Spring Creek Plant added needed peaking capacity to Westar's system, at only 225 MW net of existing contract obligations, it did not alleviate the entire need for additional peaking capacity in the near term (2008 – 2013).

We again confirmed the need for additional peaking capacity in our 2006 update. In this study, we evaluated assumptions specific to the Emporia Energy Center addition. To address those peaking needs Westar developed The Emporia Energy Center, a plant currently under construction with the first phase of generation scheduled to be completed in 2008.

Q. PLEASE DESCRIBE B&V'S INVOLVEMENT IN POWER SUPPLY PLANNING FOR WESTAR IN 2007.

A. In 2007, under my supervision and direction, we again updated the comparison of key power supply plans to account for the latest fuel price, capital cost and load growth assumptions and to evaluate a plan which included 500 MW of wind generation in Westar's portfolio. In this regard, we evaluated how this renewable resource would integrate with Westar's current long-term power supply plan.

Our planning study included an analysis of the uncertainty of wind speed (and related wind generation capacity factor) and the forecasted impact of adding 500 MW of wind generation on the annual calculated revenue requirements of Westar's generation portfolio.

Q. YOUR TESTIMONY AND ANALYSIS REFERS TO 500 MW OF WIND GENERATION, YET WESTAR IS SEEKING PREDETERMINATION FOR 300 MW OF WIND GENERATION IN THIS DOCKET. ARE YOU AWARE OF THIS?

A. Yes.

Q. WHAT IMPLICATIONS DOES THE DIFFERENCE BETWEEN 500 MW AND 300 MW IN WIND GENERATION HAVE ON THE RESULTS OF YOUR ANALYSIS?

A. First, as Mr. Greenwood discusses in his testimony, Westar is still planning on entering into power purchase agreements and owning a total of 500 MW of wind generation. Since Westar's plan involves 500 MW of wind generation, the long term planning analysis discussed in my testimony should and does address all 500 MW of wind generation. I have also conducted a supplemental study based on Westar adding 300 MW of wind generation. The conclusions of this analysis are consistent with my 500 MW study. The specific results of my analyses adding both 500 MW and 300 MW of wind generation are discussed below.

Q. WHAT IS WESTAR'S CURRENT NEED FOR POWER?

A. In Figure 1, I show Westar's current 10-year capacity requirements and capability forecast. The figure shows high, most likely and low capacity responsibility by year through 2017. This responsibility is based on the weather-normalized load forecasts developed in connection with the Emporia Energy Center Predetermination case and the Southwest Power Pool, Inc.'s (SPP) 12 percent minimum capacity margin requirement. Mr. Dietz sponsors this forecast.

For each year, the forecasted system capacity, including all capacity sales and purchases, is shown as a bar on the chart. I show in Figure 1 that, on a weather-normalized basis, Westar first needs capacity in 2008 and ultimately needs over 1,100 MW of additional capacity by 2017 based on the most likely peak demand forecast.

The peak demand forecast I show in Figure 1 is net of forecasted interruptible load.

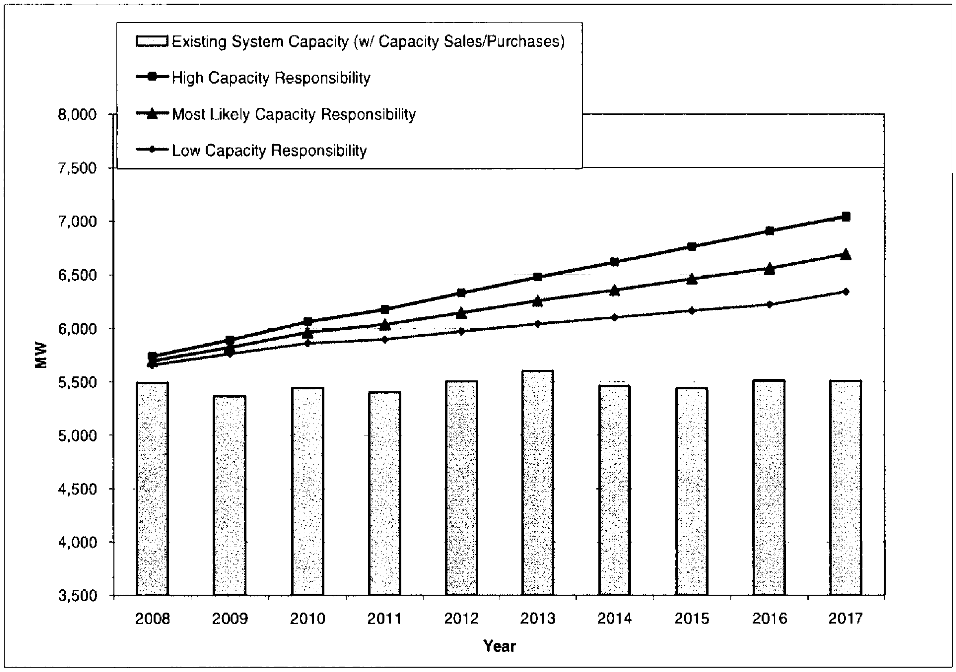

Figure 1. Ten-Year Capacity Requirements and Existing Capability

In Figure 2, I show Westar's planned capacity additions for the next 10 years in the absence of the addition of the proposed wind generation. These additions are shown as bars on top of the existing system capacity bar. The percentages listed on the chart show Westar's capacity margin percentage forecast for each year. The capacity margin percentages are calculated using the middle case (i.e., the most likely) load under the forecast.

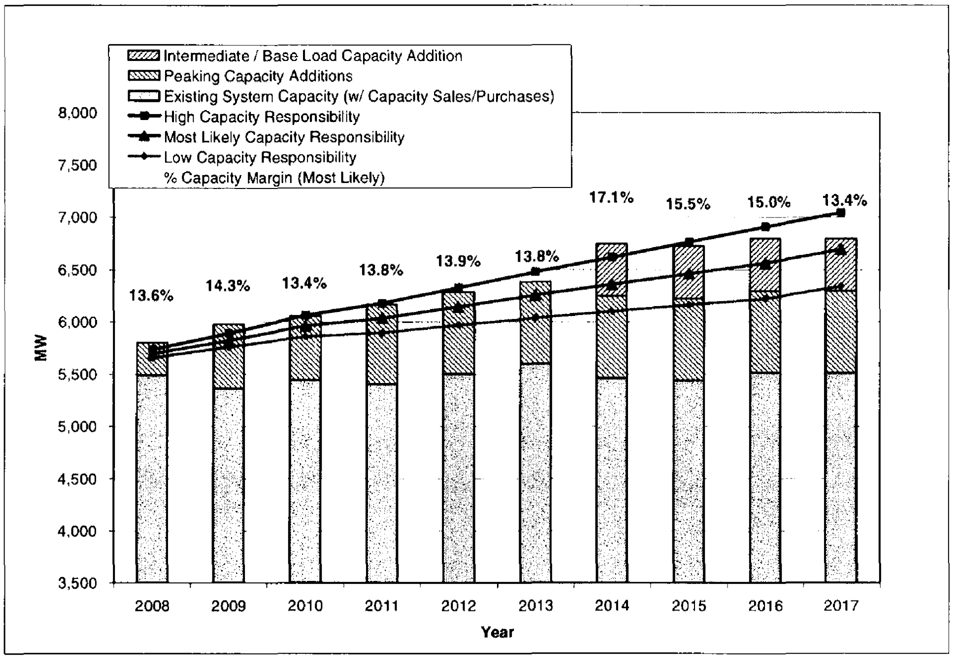

Figure 2. Ten-Year Capacity Requirements and Capability with Planned Additions

The capacity additions shown in 2008 and 2009 are the 600 MW Emporia Energy Center. Following the Emporia Energy Center addition, 300 MW of additional CTs are added, 150 MW in 2011 and 150 MW in 2012. This is followed by the addition of a 500-600 MW intermediate or baseload unit in 2014. For the purposes of this figure, no wind capacity is included.

An important consideration is that if Westar includes 500 MW of wind generation in the forecast, it may allow for a two to three year delay in the intermediate or baseload unit. The addition of 300 MW of wind generation that is the subject of this Application may allow a two year delay in such construction. I address this later in my testimony.

Q. HOW DID YOU EVALUATE THE IMPACT OF WIND GENERATION?

A. I examined what the difference in revenue requirements (i.e., impact on customers' rates) would be under various scenarios both with and without wind generation. To evaluate the impact of wind generation, I forecasted revenue requirements for each alternative expansion plan and each sensitivity case with and without 500 MW of wind generation.

For purposes of this analysis, calculated revenue requirements are defined as:

- Existing and new unit fuel and variable O&M
- New unit fixed O&M and debt service
- Wind Energy Costs (PPA, debt service, O&M)
- Emissions allowance costs and, where applicable, renewable energy credits
- Economy energy purchases and sales

I forecasted revenue requirements using a system-wide production cost model. This model simulates the hourly chronological economical commitment and dispatch of Westar's existing and new generators in each expansion plan accounting for the detailed operating characteristics for each generator. The model also accounts for opportunities for Westar to optimize and balance loads and resources by making economic purchases from, or sales into, the wholesale generation market, with the resulting wholesale activity also reflected as part of the revenue requirements.

Based on the revenue requirement differences between the two cases (i.e., with and without wind generation), I determine the forecasted financial impact of wind generation on Westar's future revenue requirements for several alternative expansion plans.

Q. WHAT ASSUMPTIONS DID YOU USE FOR WIND GENERATION IN YOUR 500 MW ANALYSIS?

A. I assumed that 250 MW of the 500 MW of wind generation will be purchased under power purchase agreements (PPAs) and the remaining 250 MW of wind generation will be constructed and owned by Westar Energy. I assumed a base case capacity factor for the wind generation of 42%, which is consistent with the estimated capacity factor values received from the bidders for the selected wind sites. Historical measured wind speed data were also collected from the wind sites. With these data Westar's consultant, WindLogics, independently verified the estimated capacity factors received from the bidders. Later in my testimony, I address sensitivity analyses performed to evaluate uncertainty in wind speed and wind generation capacity factor.

For the PPAs, I used a price of $40.75 per MWh fixed for the 20-year duration of the agreements. This price includes all operation and maintenance (O&M) costs over the 20-year period. The value of potential renewable energy credits or production tax credits (PTCs) is reflected in the assumed PPA price and is therefore not modeled separately.

I assume capital costs for the ownership portion of the wind portfolio to be $2,075 per kW, based on the average for the various projects Westar is proposing. In addition to the return of and on capital, a production tax credit (PTC) available from the federal government is included and serves to offset some of the revenue requirements for the first 10 years of ownership. This PTC is $20 per MWh in 2007 dollars, and is assumed to escalate 1 percent per year. To reflect the full pre-tax value of this tax credit as an offset to the cost of service, I gross up the PTC (to $33.20/MWh) by dividing the $20 per MWh PTC by a factor of (1-Westar's tax rate). This serves to pass through to customers the full benefits of the federal production tax credit. REC's are also included as an offset to the ownership portion of wind generation costs at a value of $3.50 per MWh of generation in 2007 dollars.

O&M costs for the ownership portion of wind generation are included at an estimated $7 per MWh for the first operating year (2008) of the project and escalate to over $15 per MWh during the 20-year study period. In Figure 3, I show the estimate of future O&M costs used in the study.

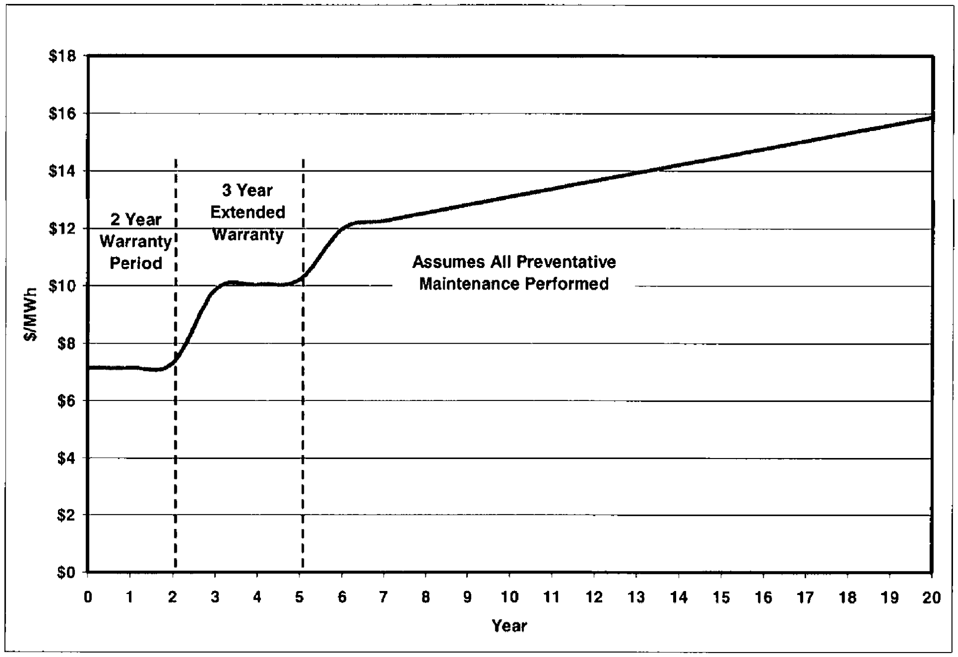

Figure 3. Wind Energy Project O&M $/MWh Costs

This O&M cost estimate is consistent with our forecast of 96% availability of the wind generation. Our O&M costs assume a robust preventative maintenance program is implemented at each wind site. The availability factor I discuss here (96%) refers to the percent of time the generator is mechanically available to produce electricity whether or not the wind is blowing, i.e., when the generator is not down for planned or unplanned repair or maintenance activities. The 42 percent capacity factor discussed earlier refers to the net average expected production from the wind generators after allowing for both mechanical outages and insufficient wind resources.

Q. PLEASE SUMMARIZE THE RESULTS AND YOUR CONCLUSIONS FROM THIS ANALYSIS.

A. A summary of the results of this analysis are shown below in Table 1. Each column of Table 1 shows 20-year NPV cumulative calculated revenue requirements for different fuel price sensitivities. Each row of Table 1 shows the results for a different expansion plan. For example, if you look at column A and compare rows 3 and 4, you can see that the 20-year cumulative NPV revenue requirements for the expansion plan with 500 MW of wind generation (Plan 3) are approximately $70 million less than the expansion plan without wind generation in the high fuel sensitivity case.

		Column:	[A]	[B]	[C]
		Fuel Price Sensitivity:	**High Fuel**	**Base Fuel**	**Low Fuel**
Row	**Base Case No CO_2 Cap and Trade System**	**Wind**	**2026 Cumulative NPV Rev Req ($1000)**	**2026 Cumulative NPV Rev Req ($1000)**	**2026 Cumulative NPV Rev Req ($1000)**
1	**Plan 1 - 500 MW PC in 2016**	**0 MW**	8,143,164	7,259,143	6,486,254
2	**Plan 1B - 500 MW PC in 2016**	**500 MW**	**8,086,683**	7,353,424	6,637,641
3	**Plan 2 - 500 MW CC (2x1 GE 7FA) in 2014**	**0 MW**	8,176,396	**7,150,637**	**6,298,441**
4	**Plan 3 - 500 MW CC (2x1 GE 7FA) in 2016**	**500 MW**	8,103,933	7,225,991	6,442,114

Table 1 – Base Case 20-year Cumulative NPV Revenue Requirements with and without 500 MW of Wind Generation

Given all the scenarios I examine and ignoring for the moment the potential for a CO_2 cap and trade system, I conclude that the expansion plans that include a 500 MW Combined Cycle addition in 2014-2017 (this addition is common to Plans 2 and 3) is the lowest cost plan under the base and low fuel price sensitivities. I also conclude that under the high fuel price sensitivity, the 500 MW PC expansion plan (Plan 1/1B) is the lowest cost plan.

For the high fuel price sensitivity, 500 MW of wind generation reduces Westar's revenue requirements slightly over 20 years. This indicates that increased fuel prices and their impact on wholesale electric prices would make wind generation a cost-effective long-term generation resource. This is due in part because wind generation would offset some of Westar's reliance on fossil-fueled generation. This demonstrates the value wind generation would have in helping Westar hedge against further increases in fossil fuel and wholesale electric prices. I address the potential cost impact of a CO_2 cap and trade system later in my testimony.

For the base and low fuel price sensitivities, I find that the addition of wind generation increases Westar's revenue requirements slightly over the 20-year study period, again, before considering a possible CO_2 cap and trade system.

Q. DID YOU PERFORM A SIMILAR ANALYSIS TO DETERMINE THE EFFECTS OF ADDING THE 295 MW OF WIND GENERATION ADDRESSED IN THE CURRENT APPLICATION?

A. Yes.

Q. PLEASE IDENTIFY THE APPROACH AND ASSUMPTIONS YOU USED IN THAT ANALYSIS.

A. I used the same approach and production cost model described earlier in my testimony to forecast revenue requirements for the Westar system.

I assumed that 146 MW of the 295 MW of wind generation will be purchased under power purchase agreements (PPAs) and the remaining 149 MW of wind generation will be constructed and owned by Westar Energy. This is a total of 295 MW of wind generation, which I have referred to nominally in this testimony as 300 MW. I assumed a base case capacity factor for the wind generation of 38.5%.

For the PPAs, I used a price of $40.62 per MWh fixed for the 20-year duration of the agreements. This PPA price includes the same per MWh assumptions with regards to O&M, availability, renewable energy credits, and PTCs as the 500 MW of wind generation discussed earlier in my testimony.

I assumed capital costs for the ownership portion of the wind portfolio to be $1,890 per kW, based on the average for the 149

MW of generation Westar is proposing. I used the same O&M, availability, renewable energy credits, and PTC assumptions for this ownership portion as I used for the 500 MW analysis discussed earlier in my testimony.

Q. PLEASE SUMMARIZE THE RESULTS AND YOUR CONCLUSIONS FROM YOUR ANALYSIS BASED ON ADDING 295 MW OF WIND GENERATION.

A. A summary of the results of the base case for 295 MW is shown below in Table 2. The results for the 295 MW case are similar to those in the 500 MW case. A summary of the results of the sensitivity analysis for 295 MW is shown below in Table 4.

		Column:	[A]	[B]	[C]
		Fuel Price Sensitivity:	**High Fuel**	**Base Fuel**	**Low Fuel**
Row	**Base Case No CO_2 Cap and Trade System**	**Wind**	**2026 Cumulative NPV Rev Req ($1000)**	**2026 Cumulative NPV Rev Req ($1000)**	**2026 Cumulative NPV Rev Req ($1000)**
1	**Plan 1 - 500 MW PC in 2016**	**0 MW**	8,143,164	7,259,143	6,486,254
2	**Plan 1B - 500 MW PC in 2016**	**295 MW**	**8,100,214**	7,300,833	6,566,511
3	**Plan 2 - 500 MW CC (2x1 GE 7FA) in 2014**	**0 MW**	8,176,396	**7,150,637**	**6,298,441**
4	**Plan 3 - 500 MW CC (2x1 GE 7FA) in 2016**	**295 MW**	8,129,299	7,188,793	6,383,971

Table 2 – Base Case 20-year Cumulative NPV Revenue Requirements with and without 295 MW of Wind Generation

Q. WHAT KIND OF SENSITIVITY/RISK ANALYSES DID YOU PERFORM?

A. The lowest cost expansion plans are compared using the following sensitivity/risk factors:

- Alternative forecasts of fuel prices (discussed above)
- Alternative CO_2 allowance price sensitivities
- Varying levels of wind speed and resultant wind generation capacity factors

These are all factors outside of Westar's control. In order to identify a robust expansion plan, it is necessary to identify the plan that will likely result in lower overall cost if these risk factors vary from our expected projections.

Q. HOW DO YOUR COMPARISONS TAKE THE POSSIBILITY OF A CO_2 CAP AND TRADE SYSTEM INTO CONSIDERATION?

A. We compare several expansion plans using our model to determine the impact of a potential CO_2 cap and trade system on system calculated revenue requirements, at two levels of assumed CO_2 allowance prices.

Q. HOW WOULD A CO_2 CAP AND TRADE SYSTEM WORK?

A. We expect that it would work in a manner similar to the SO_2 allowance system. A nationwide cap on CO_2 allowances would be set and emitters from stationary sources such as power plants would each be given an allocated share of the available allowances. Allowances would be tradeable and their price would be set by the market.

Q. HOW DID YOU ANALYZE THE AFFECT OF SUCH A PROGRAM ON THE ECONOMICS OF WESTAR'S PLAN TO ADD 500 MW OF WIND GENERATION?

A. For the first sensitivity, our approach assumed a nation-wide cap on CO_2 emissions of 25% above 2000 levels. Our analysis indicates that this cap would result in CO_2 allowance prices of $10 per ton (in 2007 dollars) beginning in 2015. For the second sensitivity, we assume a CO_2 allowance price of $25 per ton[1] (in 2007 dollars) beginning in 2015. In assuming a CO_2 cap and trade system does not begin until 2015, we are allowing time for legislation to be approved and a phase-in period to allow carbon emitters to prepare for the cap. Using the allowance prices described, we increased the regional electric market prices used in our production cost model for 2015 through 2026. We apply CO_2 emissions rates to all of Westar's existing and new generating units and run the sensitivity cases.

Q. HOW CERTAIN IS IT THAT A CO_2 CAP AND TRADE SYSTEM WILL BE ENACTED INTO LAW?

A. As with any potential future event we attempt to model, we cannot be certain what will occur or when it will occur. However, given that there have been more than 50 bills introduced in Congress, from

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[1] This assumption is based on an interdisciplinary study titled "The Future of Coal – Options for a Carbon Constrained World" Copyright © 2007 Massachusetts Institute of Technology.

members of both parties, it is reasonable to consider the implementation of a CO_2 cap and trade system likely.

Q. **HOW DO THE REVENUE REQUIREMENTS YOU CALCULATED FOR THE WIND GENERATION EXPANSION PLAN COMPARE TO THE RESULTS FOR THE NON-WIND EXPANSION PLAN?**

A. Depending on the assumptions used, the net present value (NPV) of revenue requirements over 20 years may be higher or lower if the proposed wind generation is added. For several sensitivity cases, the addition of wind generation reduces NPV of revenue requirements for the 20-year period. Table 3 summarizes the difference in calculated 20-year revenue requirements with 500 MW of wind generation less the revenue requirements without wind generation for one expansion plan under three CO_2 allowance price sensitivities and three fuel cases. The numbers shown in the table represent the change in the NPV of Westar's 20-year revenue requirement. A negative number means that the revenue requirement in the wind case is lower than without wind generation being added.

	Comparison	CO_2 Allowance Price	[A] High Fuel ($000)	[B] Base Fuel ($000)	[C] Low Fuel ($000)
[1]	**500 MW CC Expansion Plan w/ and w/o 500 MW Wind**	None	(72,463)	75,353	143,673
[2]		$10 per Ton	(104,282)	29,026	108,771
[3]		$25 per Ton	(157,715)	(38,773)	66,009

Table 3 – 20-year Cumulative NPV Revenue Requirements Differentials

For example, in Column A Row 2, the results of our $10 per ton CO_2 allowance price sensitivity comparison show that under the high fuel price sensitivity, 500 MW of wind generation decreases the 20-year NPV calculated revenue requirements by over $100 million compared to a similar expansion plan without 500 MW of wind generation.

Our analysis of the impact of adding the 295 MW of wind generation addressed by the current application provides similar results. Table 4 summarizes the results of that analysis.

	Comparison	CO_2 Allowance Price	[A] High Fuel ($000)	[B] Base Fuel ($000)	[C] Low Fuel ($000)
[1]	**500 MW CC Expansion Plan w/ and w/o 300 MW Wind**	None	(47,097)	38,155	85,530
[2]		$10 per Ton	(62,855)	19,056	73,377
[3]		$25 per Ton	(89,829)	(15,806)	57,786

Table 4 – 20-year Cumulative NPV Revenue Requirements Differentials

Q. WHAT ARE YOUR CONCLUSIONS FROM YOUR SENSITIVITY ANALYSIS?

A. I conclude that, even without considering the positive externalities related to the addition of wind generation, with the potential for a CO_2 cap and trade system and the potential for high fuel prices, it is reasonable to adopt an expansion plan that includes wind generation, as it can result in decreased revenue requirements compared to an expansion plan without wind generation. Mr. Ludwig addresses the status of the federal government's consideration of a potential CO_2 cap and trade system and strategic and policy considerations associated with wind power.

My sensitivity analysis shows that wind generation would provide long-term value to Westar as a hedge to two very important and very uncertain risk factors. These uncertain risk factors are higher than expected fuel and wholesale electric prices and the potential for a CO_2 cap and trade system. When one considers these risk factors, I believe wind generation provides important diversity to Westar's supply planning portfolio.

As I mentioned earlier in my testimony, the principal results and conclusions of this 300 MW analysis are consistent with my 500 MW study. With the potential for a CO_2 cap and trade system and the potential for high fuel prices, I conclude that it is reasonable for Westar to adopt an expansion plan that includes 300 MW as the first step in adding wind generation to its generation portfolio, as it can result in decreased revenue requirements compared to an expansion plan without wind generation.

Q. HOW DO YOU EVALUATE UNCERTAINTY IN WIND GENERATION OUTPUT?

A. Entities that responded to the Renewable RFP provided Westar with three years of projected hourly wind generation based on the most recent three years of historical wind speed data. I use these data to statistically create 30 unique ten-year wind generation projections for two possible wind portfolios. These two wind portfolios represent two potential combinations of the short-listed wind generation sites that Westar evaluated as part of its RFP.

The financial performance based on the modeling of these 30 unique ten-year projections provides statistical insights into the variance in portfolio performance due to uncertainty in wind generation output (i.e., capacity factor).

Q. WHAT IS THE VARIATION IN CALCULATED REVENUE REQUIREMENTS DUE TO WIND UNCERTAINTY?

A. The annual variability in forecasted revenue requirements due to the uncertainty of wind (based on the results of the 30 stochastic wind simulations) is between $10 and $18 million for a given year. However, the variability in NPV for all 10 years is only between $18 and $29 million. This is less than one percent of total NPV calculated revenue requirements. This small variation results because while wind generation may vary from year to year, the historical data analyzed suggest that over the long run this variation will even out.

Q. DOES YOUR ANALYSIS SHOW A DECREASE IN THE EFFICIENCY OF DISPATCHING WESTAR'S EXISTING GENERATION RESOURCES WHEN WIND IS ADDED?

A. Yes, it does.

Q. WHAT CAUSES THIS REDUCED DISPATCH EFFICIENCY?

A. Westar must operate its generation portfolio in order to attempt to meet its customer load requirements at all times. Because the amount of wind generation varies with wind speed, Westar will not be able to operate the balance of its generating fleet at optimal efficiency when the wind generators are in operation.

Q. WHY IS THAT?

A. Because wind starts and stops on an intermittent basis, Westar's other generators will be required to operate in a manner that is less efficient than if they did not need to react to changing wind generation output. Specific reasons for the decrease in efficiency (and resultant increase in costs) include additional starts and hours online for Westar's peaking generators with quick-start capability and additional ramping of generators to meet hourly and intra-hour load requirements due to variation in wind generation output. This ramping of generators often causes units to operate at a less efficient heat rate and therefore burn more fuel to generate the same amount of electricity.

Q. WHAT IS THE IMPACT ON THE EFFICIENCY OF WESTAR'S NON-WIND GENERATION RESOURCES WITH THE ADDITION OF WIND RESOURCES?

A. I find an increase (based on adding 500 MW of wind generation) in the per MWh cost of Westar's existing conventional generation resources (non-wind) of between five and seven percent on an NPV basis for base case fuel prices in the first 10 years. 300 MW of wind generation would result in a lower increase in these costs. The predominant factor which I find contributes to reduced efficiency is additional starts and hours online for peaking generation needed to accommodate the variability of wind resources.

Q. WILL THE ADDITION OF WIND GENERATION AFFECT THE TIMING OF WESTAR'S NEXT INTERMEDIATE OR BASELOAD GENERATION ADDITION?

A. Yes. I estimate that adding 500 MW of wind generation would delay by as much as two to three years the need for Westar's next new intermediate or baseload unit. The addition of 300 MW of wind generation that is the subject of this Application will delay the need for such construction by two years. Given the costs and risks associated with investing in baseload generation, such a deferral is an important consideration for Westar and its customers.

As Westar witness Paul Dietz discusses in his testimony, wind generation will not add a significant amount of reliable firm _capacity_ to Westar's generation portfolio. However, it contributes significantly to meeting Westar's annual system _energy_ requirements. The energy delivered by the wind portfolio supplants some of the _energy_ that otherwise would be generated most economically from intermediate and baseload units.

Because both 500 MW and 300 MW of wind generation will be able to serve a significant amount of Westar's system _energy_ requirements, either resource will delay the time when Westar will need additional intermediate or baseload generation, all other factors constant. This delay results because if wind is added, Westar's next new intermediate or baseload conventional unit will not be required to run at as high a capacity factor since wind will be supplying energy which would otherwise be generated by the new unit. My analysis indicates, however, that if the next intermediate or baseload plant is delayed by two or three years, Westar would need to add between 300 and 450 MW of generation capability to meet reserve requirements starting in year 2014. My analysis takes this additional generation need into account by adding peaking capacity in years 2014 and 2015 for the expansion plans that include wind generation.

Q: COULD THE DEFERRAL OF WESTAR'S NEXT INTERMEDIATE OR BASELOAD UNIT PROVIDE SIGNIFICANT BENEFIT TO WESTAR AND ITS CUSTOMERS?

A: Yes. In many ways it could. First and foremost, the capital costs of baseload generation, including traditional pulverized coal facilities, and more recently combined cycle facilities, have been increasing substantially over the last three years. Recent estimates for the 20-year levelized busbar costs[2] of a new 500 MW pulverized coal facility range between 75 to 80 dollars per MWh for a 2016

[2] Twenty-year levelized busbar costs are the weighted average of all estimated capital and operating costs for a power supply resource over 20 years with the time value of money as the weighting factor. Busbar costs include all owner costs such as the cost of financing, taxes, and depreciation, as well as fuel and fixed and variable nonfuel operating and maintenance costs. They are typically expressed on a $/MWh basis and, as such, are a function of the assumed capacity factor of the resource.

commercial operation date. The deferral of this kind of large investment and its related operating costs provides a significant benefit, as it could allow time for recent volatility in the capital cost of intermediate and baseload generation to subside. Secondly, additional time allows for new baseload generation technologies such as cleaner versions of coal plants or new nuclear technology to mature. Such technologies have the potential for generation with much less, or even no emissions. And lastly, a delay allows time for clarity in future federal environmental legislation.

Q. WHAT IS WESTAR'S CURRENT LONG TERM POWER SUPPLY PLAN?

A. Westar is currently constructing the Emporia Energy Center, a 600 MW natural gas fired combustion turbine peaking plant, which will be completed in two phases. The first phase is scheduled for commercial operation in 2008, while the second phase is scheduled for commercial operation in 2009. The current long-term power supply plan calls for additional peaking capacity in 2011 and 2012 (300 MW total), along with an additional 500-600 MW of intermediate or baseload capacity between years 2014 and 2017.

Q. WILL THE CURRENT LOW COST 20-YEAR GENERATION EXPANSION PLAN FORM THE BASIS OF WESTAR'S PLAN FOR THE NEXT 20 YEARS?

A. Perhaps, but not necessarily. Good power supply planning is a continuous process in which a long-term plan is developed based on the best information available at that time concerning future conditions and risks. While the current plan described in this testimony addresses the next 20 years, the real commitment is to the next generation additions – the wind turbines. Additional 20 or more year studies should be conducted periodically and certainly before Westar brings its next generation additions before the Commission. Those studies will consider the then best available information on load growth, fuel prices, environmental requirements and capital costs.

Q. THANK YOU.