Direct Testimony and Exhibits
Jill S. Tietjen

Before the Public Service Commission
of the State of Wyoming

Joint Application of
Cheyenne Light, Fuel and Power Company
For a Certificate of Public Convenience
and Necessity for a Gas-Fired
Electric Generating Power Plant and
Related Facilities

Docket No.20003-___-EA-11

Record No._____

Docket No. 20002-____-EA-11

November 1, 2011

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EXHIBITS

I. QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Jill S. Tietjen. My business address is 8547 E. Arapahoe Road, PMB J189, Greenwood Village, Colorado.

Q. By whom are you employed and what is your position?

A. I am the President and CEO of Technically Speaking, Inc., a firm that provides engineering consulting services. I have held this position since the firm was incorporated in August of 2005. Previously, I was self-employed as an engineering consultant.

Q. Please describe your educational and work background.

A. I graduated from the University of Virginia with a B.S. in Applied Mathematics (minor in Electrical Engineering) in 1976. I began my career with Duke Power Company and spent five years as a Planning Engineer in the System Planning Department (1976-1981). While at Duke Power Company, I earned my MBA from the University of North Carolina at Charlotte in 1979. I subsequently joined Mobil Oil Corporation's Mining and Coal Division where I worked from 1981-1984 as a planning analyst. I became a registered professional engineer in Colorado in 1982. I joined Stone & Webster Management Consultants in 1984 and by the time I left in 1992 had progressed to Assistant Vice President. I served as Principal and leader of the utility planning practice at Hagler Bailly Consulting during 1992-1995. In 1995, I rejoined Stone & Webster Management Consultants as an Assistant Vice President and office manager for the Denver office, a position that I served in through 1997. Since 1997, I have been on staff at the University of Colorado at Boulder. From 1997-2005, I was also self-employed as an engineering consultant. Also in 1997, I was elected as an outside director on the Board of Directors of Georgia Transmission Corporation and still serve in that capacity. In 2010, I was elected as an outside director for Merrick & Company of Aurora, Colorado. My resume, testimony listing, and publications listing are attached to my testimony as Exhibit JST-1.

Q. Have you testified previously in proceedings before the Wyoming Public Service Commission (Commission)?

A. Yes. In 1992, I filed testimony on behalf of Black Hills Power & Light Company, now Black Hills Power, Inc. (BHP), in Docket No. 20002-ER-95-48 under my previous name, Jill S. Baylor. In 2005, I filed testimony on behalf of Cheyenne Light, Fuel and Power Company (Cheyenne Light or Company) in Docket Nos. 20003-EA-05-82 and 30005-103-GR-05. In 2007, I filed testimony on behalf of Cheyenne Light in Docket Nos. 20003-90-ER-07 and 30005-112-GR-07. Also, in 2007, I filed testimony on behalf of BHP in Docket No. 20002-69-EA-07. In 2009, I filed testimony on behalf of BHP in Docket No. 20002-75-ER-09.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to demonstrate to the Commission that Cheyenne Light and BHP used an industry-accepted integrated resource planning (IRP) process and that the IRP processes and additional analyses resulted in the selection of the size and type of generation resources that are needed to meet the electric needs of their customers to provide reliable and economic service.

Q. What was your role in the IRP process?

A. I was hired by Cheyenne Light and BHP as a consultant to provide expert support throughout their IRP processes.

III. OVERVIEW

Q. What analysis was undertaken to determine how Cheyenne Light and BHP should best meet their obligation to provide customers with electric service?

A. Cheyenne Light and BHP each undertook an IRP process to examine practicable alternatives to select as the resources to provide their customers with reliable and economic power in the future. These analyses considered a range of conventional supply-side resources as well as renewable resources. The IRPs included risk analysis for a broad variety of factors.

Q. What factors considered in these analyses reflect the evolution of integrated resource planning?

A. Integrated resource planning in the 21st century must explicitly consider risks and uncertainties. These risks and uncertainties include not only variables that are widely recognized to be volatile, such as natural gas prices, but also must take into consideration significant changes that might occur at the federal or state level with regard to environmental regulations (i.e., carbon tax), changes in the regulatory compact, or decisions with regard to resource selection such as mandates for renewable energy resources or mandates against certain types of resources.

IV. INTEGRATED RESOURCE PLANNING

Q. Please provide an overview of the process of integrated resource planning within the electric utility industry.

A. Integrated resource planning is a process whereby an electric utility examines the future electricity requirements of its customers and determines the reliable and economic set of demand-side and supply-side resources to meet those requirements within an environment that presents risks and uncertainties going forward. The characteristics associated with all of the utility's existing resources are modeled in utility software specifically developed for this purpose. Forecasted parameters including peak demands, energy consumption, fuel prices, the market price for energy, and financial considerations are then put into the model. Expansion plans are developed for a wide variety of future considerations. Risk analysis is undertaken to look at how various expansion plans perform under many different possible future conditions. A preferred plan is selected that involves consideration of the risks and uncertainties examined in the modeling process. An action plan is then developed that summarizes the actions that the utility will take over the near-term planning horizon.

Q. Please describe the objectives of the IRP analysis.

A. The IRPs were conducted to provide a road map for defining the system upgrades, modifications and additions required to ensure reliable and economic electric service to Cheyenne Light's and BHP's electric customers now and for the future. The objectives in conducting the two IRPs were to:

- Ensure a reasonable level of price stability for each company's customers;
- Generate and provide reliable and economic electricity service while complying with all environmental standards;
- Manage and minimize risk; and
- Continually evaluate renewables for the energy supply portfolio, being mindful of the impact on customer rates.

V. CHEYENNE LIGHT'S AND BHP'S IRP PROCESS

Q. Please describe the typical planning protocol for conducting an IRP.

A. A utility gathers the data needed for:

1. The load forecast;
2. Modeling existing generating units;
3. Modeling possible future generating units; and
4. Modeling assumptions for fuel costs, emission costs, market prices, financial parameters, and so forth.

These data are input into capacity expansion and production cost computer models. Data are validated. Results are determined. The results are scrutinized. Additional analysis is performed as needed. Scenarios are developed for the risk assessment. Risk analysis is performed. All of the analysis is considered by the senior management in selecting a preferred plan. Then the results are documented in an IRP report.

Q. Is it your opinion that both Cheyenne Light and BHP followed this IRP planning protocol?

A.. Yes, it is. Each company hired Ventyx, a leading integrated resource planning vendor, to perform the computer modeling. Data were gathered by both companies and Ventyx. Cheyenne Light and BHP validated the data. As results were obtained by Ventyx, Cheyenne Light and BHP reviewed the results, corrected errors of fact, and developed alternative scenarios. Risk analysis was performed by Ventyx. Results were documented in reports that are provided as part of this Application.

VI. RESERVE MARGIN ASSUMPTION FOR THE IRP

Q. Why are reserve requirements important?

A. Not only do electric utilities have to plan for ensuring that they have enough generating resources to meet their load obligations, they must plan for additional resources to manage contingency events such as planned maintenance and forced outages that make resources unavailable to meet their load obligations.

Q. Please explain planning reserve.

A. Planning reserve is the amount of capacity that each electric utility must hold in reserve above its annual peak load requirements. A planning reserve margin is a percentage applied to the expected peak load to determine the minimum additional capacity that an electric utility should plan for to ensure that it will meet its peak load obligations in the event of an unforeseen loss of generating resources due to extreme weather or other unexpected conditions.

Q. What level of planning reserve margin was used for the Cheyenne Light and BHP IRPs and how were these levels determined?

A. Both Cheyenne Light and BHP assumed a planning reserve margin of 15% for these analyses. Minimum planning reserve margins can vary depending upon the requirements established by various authorities across the country and the unique aspects of different utilities, i.e., the size of a utility's largest hazard. A 15% minimum planning reserve margin is typical. It is important to note that when electric utilities are conducting long-term resource plans, they need to establish a range for planning reserves, both a minimum and a maximum planning reserve margin, so that various resource alternatives may be analyzed. Resource additions tend to be "lumpy" and utilities expect as loads increase over time, or older units are retired, that they will "grow" into the new resource additions. The minimum planning reserve margin must also account for operating reserve requirements. When identifying resource types to meet planning reserve requirements, it is important to consider the need for operating and regulating reserves, for example quick-start capability and flexible operating parameters.

Q. Please summarize the importance of managing reserve requirements.

A. To ensure that interruption of supply does not impact a utility's ability to serve its customers, utilities must appropriately manage reserve requirements. The North American Electric Reliability Corporation (NERC) has established specific standards requiring that utilities acquire sufficient reserves to support the overall reliability of the bulk transmission system. Failure to comply with these standards could result in significant financial sanctions and would put the interconnected electric system at risk.

As a utility conducts planning studies, reserve requirements are an important consideration not only to ensure that sufficient capacity is available, but also to ensure that its resource supply portfolio consists of a variety of supply-side options to meet both spinning and non-spinning operating reserve requirements.

Q. **Is a 15% planning reserve margin a reasonable assumption for both the Cheyenne Light and the BHP IRPs?**

A. Yes.

VII. IRP CONCLUSIONS

Q. **Please summarize the Cheyenne Light IRP conclusions.**

A. After consideration of the Company's objectives, available conventional and renewable resources, the likely contributions of demand-side management, the impacts of an imposition of a carbon dioxide tax, and a wide range of possible future scenarios, the Cheyenne Light IRP concluded that the next resource needed to meet the needs of Cheyenne Light are three combustion turbine generators in 2014.

Q. **Please summarize the BHP IRP conclusions.**

A. After consideration of the Black Hills Power's objectives, available conventional and renewable resources, the likely contributions of demand-side management, the impacts of an imposition of a carbon dioxide tax, and a wide range of possible future scenarios, the BHP IRP concluded that the next resource needed to meet the needs of BHP is a retrofit of a combustion turbine to combined cycle.

Q. This CPCN application proposes one combustion turbine unit and one jointly-owned combined cycle unit to be built in Cheyenne. Do you believe that this decision is supported by the IRPs conducted and the additional analyses that were completed by Cheyenne Light and BHP?

A. Yes, I do. While the combustion turbine and joint ownership in a combined cycle were not the base or preferred plan in the Cheyenne Light IRP, additional analysis supports this decision. The combined cycle unit conversion identified in the BHP IRP provided an opportunity for Cheyenne Light to jointly own a combined cycle resource that was not an option considered in the Cheyenne Light IRP. Further analysis showed that by including a combined cycle conversion as a resource option in the capacity expansion modeling, the present value of revenue requirements (PVRR) for Cheyenne Light was reduced by $15.5 million.

Q. Have you seen other utilities make decisions for resources that consider factors outside of an IRP process?

A. Yes, I have. Over the course of normal business operations, opportunities are presented to utility management that need to be investigated and acted upon. Analysis is generally conducted outside of the IRP process that demonstrates whether or not those opportunities should be pursued. When the analysis is favorable, utility managers proceed with the opportunities, even outside of the IRP process.

Q. Do you agree with and support the business decision made by Cheyenne Light and BHP?

A. Yes. I believe that building a combined cycle unit jointly-owned by Cheyenne Light and BHP represents a business opportunity that should be undertaken. A combined cycle unit mitigates many business risks for Cheyenne Light over the long term: resource, market, environmental, and regulation.

Resource Risk: A combustion turbine is solely a peaking unit. A combined cycle unit can provide baseload, intermediate, and peaking capacity and energy. Thus, a combined cycle provides much greater operating flexibility.

Market Risk: A combined cycle unit has a lower heat rate – and operates more efficiently than a combustion turbine. Thus, if market power is not available in the future or is not economic, the combined cycle unit can provide the energy needed more economically than a combustion turbine. Over the planning horizon, the price and availability of market power is significantly affected by factors including the retirement of coal-fired units in response to regulations issued by the Environmental Protection Agency, retrofits required for nuclear units mandated by the Nuclear Regulatory Commission in response to earthquakes in Japan and Virginia, and long-term natural gas prices as impacted by shale gas availability and pricing, among others.

Environmental Risk: The lower heat rate for the combined cycle unit requires less fuel for the same level of generation and thus results in lower emissions.

However, the combined cycle unit does require more water than a combustion turbine.

Regulation Risk: The combined cycle unit is capable of providing wind regulation more efficiently than the combustion turbine.

Q. **Does this conclude your testimony?**

A. Yes.